Installation, Operation and Maintenance

Bulletin OM40 Rev C

4.0 Meter Earth Station Antenna

Type ES40C-1, ES40K-1, ES40CM-1 and ES40KM-1

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DO NOT DISCARD CONTENTS
The product in this packaging was placed in the market after August 13, 2005. Its components must not be discarded with normal municipal or household waste.

Contact your local waste disposal agency for recovery, recycling, or disposal instructions.

Introduction

Like all Andrew earth station antennas, the 4.0 meter earth station antenna provides high gain and exceptional pattern characteristics. The electrical performance and exceptional versatility provides the ability to configure the antenna with your choice of transmit/receive as well as receive-only, and for either linearly- or circularly-polarized C-band and linearly-polarized operation. A pedestal mount version is available for addition of motorization. The versatility is provided at the time of initial purchase, as well as in the future, as your satellite communications requirements evolve.

The segmented aluminum reflector panels are precision formed for accuracy and strength. The 6-piece reflector panel design ensures that the assembled reflector will maintain the extremely accurate surface contour and guaranteed performance without reflector alignment.

The versatile tripod mount features 180° of coarse azimuth coverage in four overlapping ranges, and 90° coarse elevation adjustment. This large range of adjustment provides the ability to view geostationary satellites from horizon-to-horizon, from any location within the continental United States.

The motorizable pedestal mount features self-aligning bearings for the elevation pivots, resulting in "zero" backlash. This mount can be operated manually, but has the potential to be upgraded for motorized operation, including steptracking/Smartrack™ applications. The motorizable mount type is indicated by the ES40CM-1 or ES40KM-1 letters within the antenna type number. The azimuth/elevation jackscrews are equipped for integration with the optional motor drive systems.

A manual pedestal mount is also available. It provides the same strong and versatile combination of mechanical features as the motorizable version; except that the elevation and azimuth axes are locking types, instead of bearing mounted types. This mount type is always equipped with manual struts and a fixed mount for the separately ordered combining network. This mount has been designed for manual applications only and cannot be upgraded to a motorizable mount.

The aluminum back structure and hot-dipped galvanized steel mount maintains pointing accuracy and ensures durability and reliability. The antenna and mount will survive 125 mph (200 km/h) wind, in any position of operation, without damage or permanent deformation.

Andrew provides a complete line of available options, including field-installable electrical anti-icing heaters, pressurization equipment and interconnecting HELIAX cables and waveguide.

An optional hoisting kit, which precludes the use of a crane, is available from Andrew and can be utilized as an installation tool for multiple installation purposes.

Introduction

Proprietary Data

The technical data contained herein is proprietary to Andrew Corporation. It is intended for use in installation, operation, and maintenance of Andrew equipment. This data shall not be disclosed or duplicated in whole or in part without express written consent of Andrew Corporation.

Information and Assistance

Andrew corporation provides a world-wide technical support network.

Notice

The installation, maintenance, or removal of antenna systems requires qualified, experienced personnel. Andrew installation instruction have been written for such personnel. Antenna systems should be inspected once a year by qualified personnel to verify proper installation, maintenance, and condition of equipment.

Andrew disclaims any liability or responsibility for the results of improper or unsafe installation practices.

All designs, specifications, and availabilities of products and services presented in this manual are subject to change without notice.

Technical Assistance

24-hour Technical Assistance

For technical assistance, call the following numbers at anytime.

Call From	Call To	Telephone	Fax
North America (toll free)	U. S. A.	1-(800)-255-1479	(800)-349-5444
Any Location (International)	U. S. A.	(708)-349-3300	(708)-349-5410

Customer Service Center

The Andrew Customer Service Center gives you direct access to the information and personnel service you need, such as the following:

- Place or change orders
- Check price and delivery information
- Request technical literature

You can call from any of the following:

Call From	Telephone	Fax
North America	1-800-255-1479 (toll free)	1-(800)-349-5444 (toll free)
United Kingdom	00-800-0-255-1479 (toll free)	00-800-0-349-5444 (toll free)
Australia	0011-800-0-255-1479 (toll free)	0011-800-0-349-5444 (toll free)
China	00-800-0-255-1479 (toll free)	00-800-0-349-5444 (toll free)
New Zealand	00-800-0-255-1479 (toll free)	00-800-0-349-5444 (toll free)
Hong Kong	001-800-0-255-1479 (toll free)	001-800-0-349-5444 (toll free)

How to Use This Manual

Overview

The scope of this manual is intended to provide station personnel with the base installation (ie: mount, reflector and enclosure), operation and maintenance requirements necessary for a 4.0 Meter Earth Station Antenna.

Note: All antenna option instructions are included in the individual kit shipped with the part. This manual provides a convenient reference for authorized operator/service personnel requiring technical information on general system or specific subsystem equipment.

Content

The tables and figures presented in this manual are used as communication aids for the installation, operation and maintenance of the 4.0 Meter Earth Station Antenna. These tables and figures instantly convey messages, as well as make the procedures easier to understand. This manual uses tables and figures for the following references:

- **Tables** The tables allow you to locate information quickly and easily.
- **Drawings** The drawings supplement the installation instructions by using a combination of graphics and verbiage to assist you in simplifying complex procedures and clarifying components
- **Photographs** The photographs complement the installation instructions by providing actual examples of the steps being performed, which allow you to view the installation in process.

The manual is divided into five distinct sections, each dealing with a specific technical topic relating to either system or component subsystem information. The sections contained in this manual are described and listed under the following technical headings:

- **How to Use This Manual** Describes the manual's purpose, content, and communications aids. Additionally, this section lists the related documentation for the 4.0 Meter Earth Station Antenna.
- **Getting Started** Provides the preliminary information needed to perform a successful installation. This section should be reviewed prior to the installation. The warnings, recommended tools, parts verification, instructions on reporting lost or damaged equipment and installation checklist are located in this section.
- **Installation Procedures** Provides the procedures for the different phases of a 4.0 Meter Earth Station Antenna base installation. This section will help you easily find requirements for an individual task, as well as display the sequence for each tasks execution.
- **Operation** Describes the controls, functions, and general operating procedures required for proper operation of the 4.0 Meter Earth Station Antenna
- **Maintenance** Describes preventative maintenance procedures that are required to maintain proper functional operation of your new Andrew Earth Station Antenna.

Getting Started

Overview

The installation, operation and maintenance of the 4.0 Meter Earth Station Antenna requires qualified personnel. Andrew installation, operation and maintenance instructions are illustrated for such personnel. Additionally, the antenna should be inspected by qualified personnel to verify proper installation, maintenance and condition of equipment as described in Preventative Maintenance. The basic equipment and accessories are either manufactured or design controlled by Andrew Corporation.

The prerequisite information necessary for the 4.0 Meter Earth Station Antenna can be found in this section. Furthermore, this section should be reviewed before performing the installation, operation or maintenance. Warnings, recommended tools and the antenna parts can be verified and/or determined with such a review.

Warnings

When installing the 4.0 Meter Earth Station Antenna, be conscious of the warnings presented below. For further information or clarification of this information, contact the Customer Service Center at one of the phone numbers listed. The warnings are as follows:

1. Electrical shock from voltages used in this antenna system may cause personal injury or death. Prior to making any electrical connections or performing maintenance or repair, ensure that the power is removed. Electrical connections should only be made by qualified personnel in accordance with local regulations.

2. Installation of antenna may require persons to work at elevated work stations. Whenever persons are working at eight or more feet above the ground and not on a guarded platform, they should wear safety belts with at least one (preferably two) lanyards.

3. Never stand underneath any object while it is being lifted.

4. Always wear a hard hat, especially if someone is above you.

5. Make sure no person is in or under the reflector while it is being lifted or positioned; personal injury can result if the reflector assembly falls.

6. Personnel should never be hoisted in or out of the reflector by crane; personal injury may result.

7. Andrew earth station antennae supplied to standard product specifications will survive 125 mph winds in any operational position in moderate coastal/industrial areas. Severe conditions require additional protection. Should it be expected that winds will exceed 125 mph, it is recommended that Andrew antennae be steered to specific azimuth and elevation orientations to minimize wind forces upon the structure and thereby increase the probability of survival.

8. It is recommended that all cross axis-waveguide and coaxial cables are secure such that high winds will not cause excessive flexing. Position the antenna to an elevation of 90 degrees. The azimuth jackscrew should be placed in the center of its travel.

9. When the antenna is transmitting, severe eye injury or injury to other parts of the body can result from exposure to radio frequency (RF) energy. The antenna must be turned off before entering the area in front of the reflector and near the feed.

Getting Started

Note: Failure to follow an installation procedure could result in damage to equipment or personal injury.

Additional warnings will be displayed throughout this manual for your awareness. These warnings can be identified in warning boxes as shown in the sample to the right.

WARNING
Additional warning information will be located in this type of format.

Andrew disclaims any liability or responsibility for the results of improper or unsafe installation, operation or maintenance practices.

Recommended Tools ES40CM-1 or ES40KM-1

Andrew supplies all appropriate hardware/parts required for the installation of your 4.0 Meter Earth Station Antenna. All tools necessary for the installation process should be provided by the installation crew. Andrew recommends that the following tools be used for a proper installation of the 4.0 Meter Earth Station Antenna.

Table 1. Recommended Tools

Tool	Size	Qty.
Open End Wrench	1/4″ 3/8″ 1/2″ 9/16″ 5/8″ 3/4″ 7/8″ 1-1/4″	2 2 2 2 2 2 2 1
Drive Sockets	7/16″ 9/16″ 3/4″ 7/8″ 1-1/16″ 1-1/4″	2 1 1 1 1 1
Spud Wrench	1-1/16″	1
Breaker Bar	1/2″	1
Screw Driver	Standard Phillips	1 1
Allen Wrench	1/2″	1
Tape Measure	Standard	1
Felt-tip Marker	Standard	1
Hammer	Standard	1
Rubber Mallet	Standard	1
Pry Bar	Standard	1
Tin Snips	Standard	1
Crane	1 Ton Minimum Capacity	1
Rope/Cord (2000 lb breaking strength)	50 ft	1
Shackles	5/8″	2
Ladder	10 Foot Extension	1
Nylon Web Sling	3″ x 3′	2

Getting Started

Recommended Tools

Andrew recommends that the following tools be used for a proper installation of the Earth Station Antenna.

Table 1. Recommended Tools

Tool	Size	Qty.
Open End Wrench	13 mm 3/8″ 1/2″ 9/16″ 1 1/8″ 1.5″ 15/16″ 2 1/4″ 1″ 1 5/16″ 27/32″	2 2 2 2 2 2 2 2 2 2 2
Drive Sockets	7/16″ 9/16″ 1″ 13mm	2 1 2 1
Spud Wrench	1-1/16″	1
Breaker Bar	1/2″	1
Screw Driver	Standard Phillips	1 1
Allen Wrench	5 mm	1
Tape Measure	Standard	1
Felt-tip Marker	Standard	1
Hammer	Standard	1
Rubber Mallet	Standard	1
Pry Bar	Standard	1
Tin Snips	Standard	1
Crane	1 Ton Minimum Capacity	1
Rope/Cord (2000 lb breaking strength)	50 ft	1
Shackles	5/8″	2
Ladder	10 Foot Extension	1
Nylon Web Sling	3″ x 3′	2

Tool and Hardware Conversion Chart

Bolts and Wrenches Chart, Possible US to Metric Substitution During 4.0 Meter ESA Installation**

Bolt							Open Wrench	Metric Bolt (Gr 8.8 DIN 933)			Open Wrench
Location	BOM	Item No.	Base Diam.	Length	Qty.	Material	inches	Base Diam.	Standard Length	Material	millimeters
Sub Reflector	2	7	3/8-16	1.5	8	SS	9/16	M10 x 1.5	40	#933 A4	17
	2	8	3/8-16	1.125	4	SS	9/16	M10 x 1.5	30	#933 A4	17
	2	12	3/8-16	6	3	SS	9/16	M10 x 1.5	120	#933 A2	17
Reflector	3	111	5/16-18	1.25	40	SS	1/2	M8 x 1.25	30	#933 A4	13
	3	117	3/8-16	1.5	15	SS	9/16	M10 x 1.5	40	#933 A4	17
	3	121	1/4-20	1.25	24	SS	/8	M6 x 1	30	#933 A4	10
	3	125	M6	1	250	SS	5 mm Allen	M6	25	Hot dip Glv	5mm Allen
	3	126	3/8 SHLDR	0.75	15	SS	9/16	SHLDR M10/M8 x 1.25 20 mm SHLDR Length, 13 mm THRD Length	20	SO 7379, I12.9 CLASS	5mm Allen
Mount	3	101	3/4-10	2	40	G	1 1/8	M20 x 2.5	50	Hot Dip Glv	30
	3	107	1-8	5	1	G	1 1/2	M24 x 3	130	Hot Dip Glv	36
	3	108	1-8	2.5	2	G	1 1/2	M24 x 3	65	Hot Dip Glv	36
	3	111	5/8-11	2.25	4	SS	15/16	M18 x 2.5	60	Hot Dip Glv	27
	3	115	3/4-10	10	1	SS	1 1/8	M20 x 2.5	180	#933 A2	30
	3	120	Rod End 3/4"		2	-		Rod end M20 x 1.5, 20mm ball / Articulated rod ends #648 "K" K20MR	47	Hot Dip Glv	-
	3	123	3/4-10	5	4	g	1 1/8	M20 x 2.5	130	Hot Dip Glv	30G

Nuts and Wrenches Chart, Possible US to Metric Substitution During 4.0 Meter ESA Installation**

Nut							Open Wrench	Nuts (Gr 8.8 DIN 934)		Open Wrench
Location	BOM	Item No.	Base Diam.	Length	Qty.	Material	inches	Base Diam.	Material	millimeters
Sub Reflector	2	6	3/8-16		28	ss	9/16	M10 x 1.5	#934 A4	17
	2	13	3/8-16	thin	9	ss	9/16	M10 x 1.5	#439 B-A4	17
	2	15	3/8-16		6	ss	9/16	M10 x 1.5	#934 A4	17
Reflector	3	114	5/16-18		60	ss	1/2	M8 x 1.25	#934 A4	8
	3	116	M6	1	250	ss	13mm	M6	Hot Dip Glv	13
	3	120	3/8-16		15	ss	9/16	M10 x 1.5	#934 A4	17
	3	124	1/4-20		24	ss	7/16	M6 X 1	#934 A4	10
	3	102	1 1/2-6		4	ss	2 1/4	M36 x 4*	#934 A4	55
	3	105	3/4-10		35	g	1	M20 x 2.5	Hot Dip Glv	30
	3	109	1-8		10	g	1 5/16	M24 x 3	Hot Dip Glv	36
Mount	3	114	5/8-11		8	ss	27/32	M18 x 2.5	#934 A4	27
	3	121	1 1/2-6	drilled	1	g	2 1/4	M36 x 4*	Hot Dip Glv	55
	3	124	3/4-16	thin	3	g	1	M20 x 2.5	#439 B-A2	30

** - For Reference only. ** - Lock and Flat washers choose according to specified Bolts & Nuts size*

Getting Started

Parts Verification

Upon receipt of your order, the shipment should be verified to ensure that all parts have reached your site. This process should occur before the installation process begins.

Andrew Corporation thoroughly inspects and carefully packs all equipment before shipment. If you find that there are missing components, please refer to step-by-step instructions on how to properly report the equipment loss.

When you have received your order, verify that all parts contained in the shipment correspond to the parts listed on your packing list.

Reporting Equipment Loss or Damage

If you find that the equipment was damaged during the shipping process, you should file a claim with the carrier. Follow the "Reporting Visible Loss or Damage" or "Reporting Concealed Damage" procedures when filing a claim with a carrier.

Reporting Visible Loss or Damage

Make a note of any loss or evidence of external damage on the freight bill or receipt, and have it signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier refusing to honor a damage claim. The form required to file such a claim will be supplied by the carrier.

Reporting Concealed Damage

Concealed damage means damage which does not become apparent until the unit has been unpacked. The contents may be damaged in transit due to rough handling, even though the carton may not show external damage. If you discover damage after unpacking the unit, make a written request for an inspection by the carrier's agent, then file a claim with the carrier since such damage is most likely the carrier's responsibility.

Inventory Equipment Received

After opening your shipment, you should take inventory of the parts immediately. Check each item received in you shipment against the packing slip included with the shipment. If any items are missing, please notify Andrew Corporation immediately by contacting the Customer Service Center at one of the phone numbers listed.

Returning Equipment

Andrew Corporation tries to ensure that all items arrive safe and in working order. Occasionally, despite these efforts, equipment is received that is not in proper working condition. When this occurs, and it is necessary to return the equipment to Andrew Corporation for either repair or replacement, return can be expedited by using the following procedure:

Step 1

Call the Andrew Customer Service Center and request a Return Material Authorization (RM) number, as well as the address to which you should forward the material(s).

Step 2

Tag or identify the defective equipment, noting the defect or circumstances. Also, be sure to write the RM number on the outside of the carton. It would be helpful to reference the Andrew sales order and purchase order number, as well as the date the equipment was received.

Step 3

Pack the equipment in the original container with protective packing material. If the original container and packing material are no longer available, pack the equipment in a sturdy corrugated box and cushion it with appropriate packing material.

Step 4

Be sure to include the following information when returning the equipment:

- Your Company Name
- Your Company Address City, State and Zip Code
- Telephone Number
- RM Number
- Problem Description
- Contact Name

Note: Absence of the RM number will cause a delay in processing your equipment for repair. Be sure to include the RM number on all correspondence.

Step 5

Ship the equipment to Andrew Corporation using UPS, U.S. Postal Service, or other appropriate carrier, freight prepaid and insured. The material should be forwarded to the address given by the Andrew contact in Step 1.

Getting Started

Installation Sequence Checklist

The 4.0 Meter Earth Station Antenna requires the installation team to perform the assembly in the sequence presented below. Moreover, this sequence should be reviewed beforehand to ensure a smooth installation. Use the following checklist to verify and/or determine the installation sequence. Throughout the checklist certain part numbers will be used. Those part numbers describe the antenna currently being installed. The ES40C-1 is a transmit/receive 4.0 Meter ESA with a manual pedestal mount. The ES40CM-1 is a transmit/receive 4.0 Meter ESA with a motorizable pedestal mount.

Site Preparation

Refer to Foundation Specifications for guidance in preparing the location and the installation of the 4.0 Meter Earth Station Antenna foundation.

Pedestal Ground Mount Assembly

- ✍ Unpack ground mount assembly
- ✍ Attach ground mount assembly to foundation
- ✍ Organize ground mount hardware
- ✍ Wax galvanized hardware in hardware kit
- ✍ Tighten ground mount hardware to foundation
- ✍ Attach azimuth strut weldment to ground mount assembly

ES40 Main Reflector Assembly

- ✍ Remove protective covering from crate
- ✍ Pry top crate panel off
- ✍ Pry sides off crate
- ✍ Pry front off crate
- ✍ Unbolt reflector panels from bottom of crate
- ✍ Prepare assembly area with diameter setting bands and temporary supports
- ✍ Lay reflector segments on prepared assembly area
- ✍ Attach opposite segments to mounting ring hub and diameter setting bands
- ✍ Attach remaining segments to mounting ring hub and original panels
- ✍ Attach reflector rib segments to panel seams
- ✍ Tighten seam hardware in concentric circles around reflector
- ✍ Install center plate and center pad to mounting ring hub
- ✍ Attach feed strut brackets and feed struts
- ✍ Pull boot over jackscrew

ES40K-1

- ✍ Assemble pedestal mount
- ✍ Follow the Ku Upgrade Kit instructions supplied with the Upgrade Kit
- ✍ Assemble ES40 Reflector
- ✍ Attach C-Band or Ku-Band Feed
- ✍ Follow the feed installation instructions supplied with the kit

Getting Started

Site Preparation ES40CM-1 or ES40KM-1

Refer to Foundation Specifications for guidance in preparing the location and the installation of the 4.0 Meter Earth Station Antenna foundation.

Pedestal Ground Mount Assembly ES40CM-1 or ES40KM-1

- ✍ Unpack ground mount assembly
- ✍ Attach ground mount assembly to foundation
- ✍ Organize ground mount hardware
- ✍ Wax galvanized hardware in hardware kit
- ✍ Tighten ground mount hardware to foundation
- ✍ Attach azimuth strut weldment to ground mount assembly
- ✍ Mount azimuth pivot assembly to ground mount assembly
- ✍ Bolt one jack to azimuth pivot assembly
- ✍ Unscrew jack
- ✍ Tighten galvanized hardware using A-325 hardware procedure
- ✍ Lubricate jackscrews
- ✍ Pull protective boot over jackscrew
- ✍ Bolt elevation pivot assembly brackets to ground mount assembly
- ✍ Bolt second jack to elevation pivot assembly
- ✍ Unscrew jack
- ✍ Tighten galvanized hardware using A-325 tensioning procedure
- ✍ Lubricate jackscrews

Installation Procedures

Overview

This section provides installation procedures for the 4.0 Meter Andrew Earth Station Antenna. The installation procedures include instructions on the following antenna components.

- Mount
- Reflector
- Back Structure
- Reflector To Mount Assembly
- Subreflector
- Feed System

Note: All installation instructions for the antenna options are contained in the parts kit included in the shipment.

Foundation Preparation

Before beginning the installation process on the ground mount assembly, ensure that the foundation has been prepared. Foundation specifications are provided by Andrew and may be used as a reference by civil engineering personnel when preparing the foundation for local soil conditions. These specifications are available before the shipment arrives by contacting the Customer Service Center.

To ensure level, smooth surface for mount, remove excess concrete from shear caps and anchor bolts as shown in Figure 1.

Figure 1

Installation Procedures

A-325 Tensioning

During the installation process there are several references to the A-325 hardware tensioning procedure. The A-325 hardware must be properly tensioned to avoid slippage between bolted surfaces under high loads. Slippage can cause the corresponding assembly to move, causing antenna misalignment. When designated, the A-325 hardware should be tightened according to the following tensioning procedure.

Note: Tensioned bolts are for final connections only and should not be loosened for reuse.

Step 1 Lubricate the bolt threads with the provided stick wax to reduce friction.

Step 2 Insert the bolt, and add a flat washer - if required. Do not allow wax under the flat washer.

Step 3 Add the nut and finger-tighten.

Step 4 After the connections are complete, tighten the bolts until the surfaces are joined and the nuts are snug (for example, full effort of a person using an ordinary spud wrench).

Do not proceed with Steps 5 and 6 unless the connection is final and is not intended to be loosened again.

Note: If the bolts are loosened after Steps 5 and 6, discard and replace with new hardware.

Step 5 Using a felt-tip marker, mark the nuts and the ends of the bolts with a straight line as shown in Figure 2a and 2b.

Step 6 Tighten the nuts further with an extra-long wrench until the nuts are moved 1/3 turn (120 degrees) as shown in Figure a for bolt lengths shorter than four diameters and 1/2 turn (180 degrees) as shown in Figure 2-B for bolt lengths longer than four diameters.

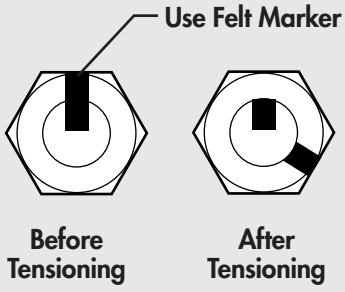


Figure 2a. A-325 Tensioning

For Bolts Shorter Than 4 Diameters

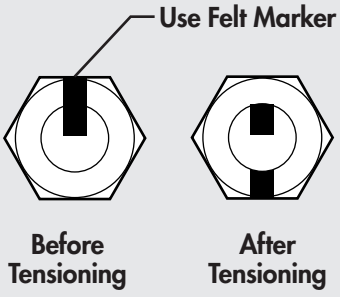


Figure 2b. A-325 Tensioning

For Bolts Longer Than 4 Diameters

Note: Do not perform A-325 tensioning procedure during assembly process unless specifically designated by installation instructions. Final tightening will occur after mount is fully assembled.

Installation Procedures

Mount Assembly

As stated earlier, Andrew recommends the use of a crane during this installation process; however, we recognize that a crane may not always be available. If a crane is not available you can use Andrew Manual Lifting Kit or similar options

The elevation/azimuth low cost manual mount design simplifies installation, minimizes foundation requirements, and enables horizon-to-horizon coverage from any worldwide location. The ground mount assembly enables 180 degree positioning for selected azimuth viewing. Azimuth range coverage is plus or minus 90 degrees, divided into three 120 degree continuous ranges with a 20 degree overlap. Elevation adjustment is continuous from 0 degrees to 90 degrees.

After ensuring that the foundation has been properly prepared , anchor bolts and pipe pedestal correctly installed (Andrew PEDMNT-4 or similar 10.75in O.D. schedule 40 pipe weldment 64.25in min long) - the ground mount assembly process may begin.

Unpacking

The low cost manual mount parts arrive in a packaged wooden crate. The mount can be positioned manually or by using a crane; however, Andrew recommends that this procedure be performed using a crane to ensure speed and ease of installation.

Step 1

Carefully remove the manual mount parts from the packing crate.

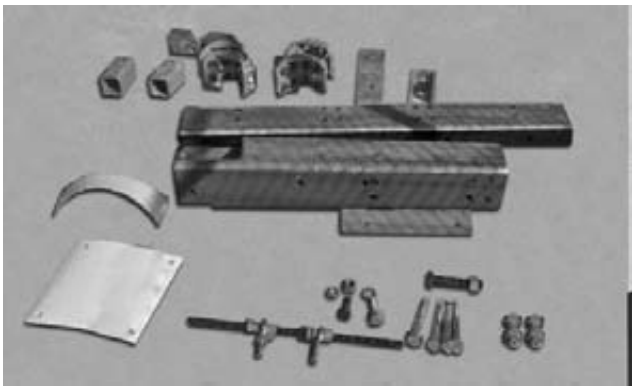


Figure 3

Figure 4

Step 2

Tighten the foundation hardware using the A-325 tensioning procedure. (Pipe pedestal similar to Andrew PEDMNT-4 should be previously installed or purchased from Andrew Corporation.)

Figure 5

Installation Procedures

Step 3

Prepare the ground mount hardware in the mount hardware kit by sorting all bolts, nuts, and flat washers into separate sections as shown in Figure 6.

Figure 6

Figure 7

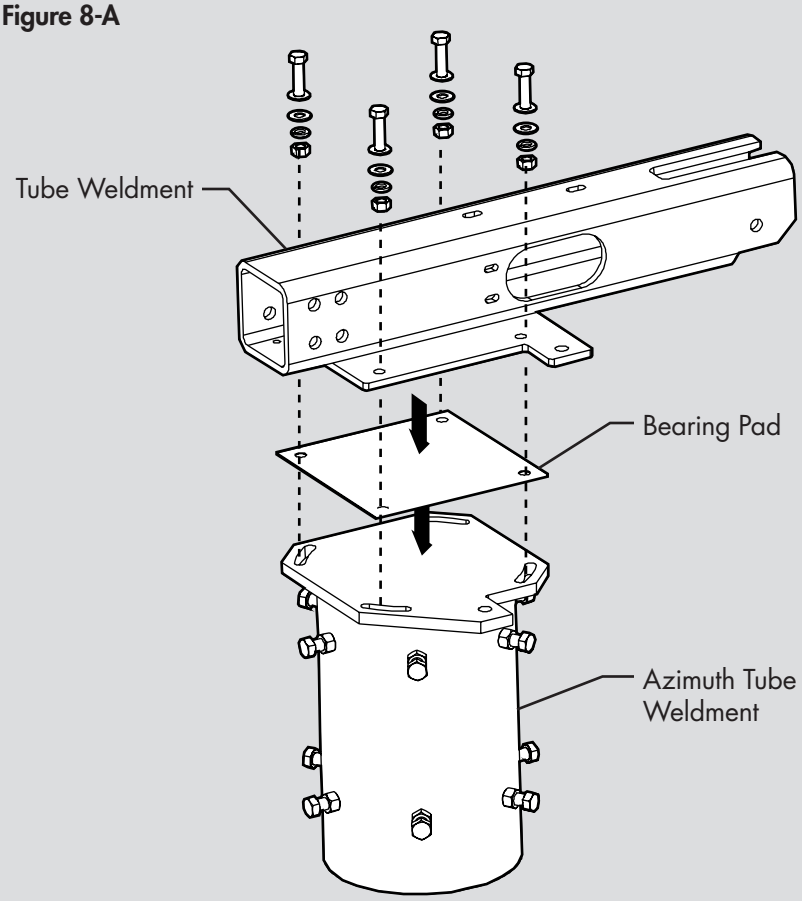
Step 4

Wax two sides of each galvanized bolt with the stick wax provided. This allows a smooth installation of each galvanized bolt as shown in Figure 7.

Step 5

Set Azimuth Tube Weldment (7542711) on the ground near the pedestal. Put (7542635) bearing pad on top of it, line up the bolt holes with the slots, place Tube Weldment (7545086) on top of the pad secure it with (4) x 5/8-11 hardware. Snug Tighten the bolts

Figure 8-A

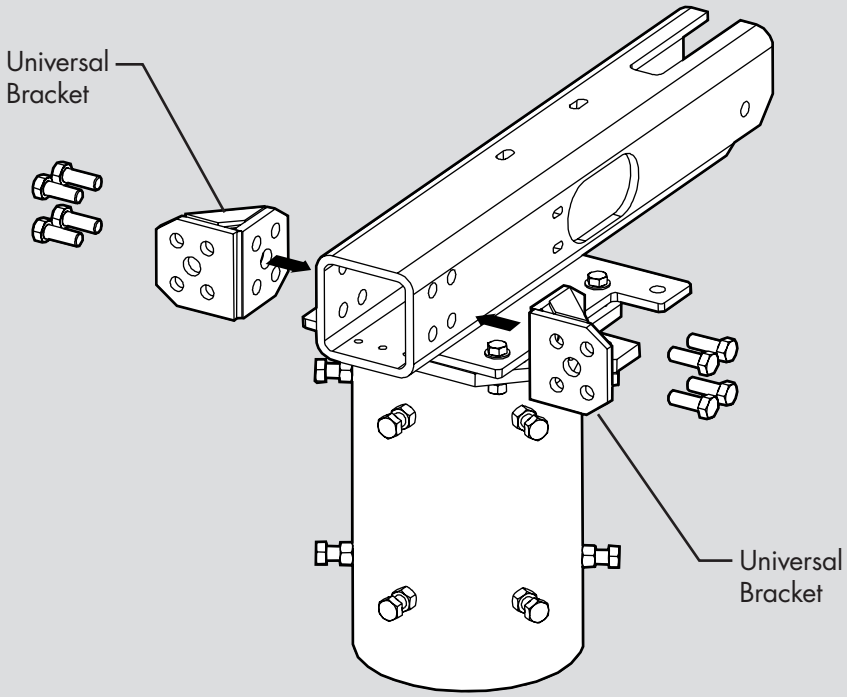


Installation Procedures

Step 6

Install Two Universal Brackets (7542460) using (8) x 3/4-10 hardware. Tighten bolts per ASTM A325 procedures.

Figure 8-B



Note: Insure that frontal faces of the universal brackets and tube weldment are in plane and leveled.

Figure 8-C

Figure 8-D

Installation Procedures

Step 7

Install Reflector Support Tube (7542474) to the previous installed universal brackets using front access slots and (8) x 3/4-10 hardware. Tighten bolts per ASTM A325 procedures.

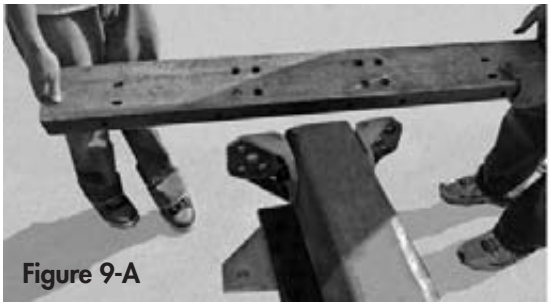


Figure 9-A

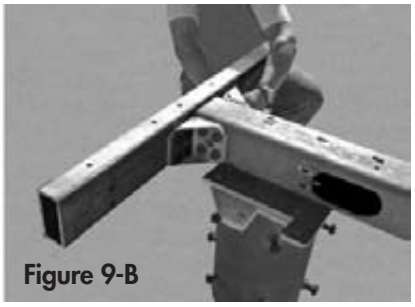


Figure 9-B

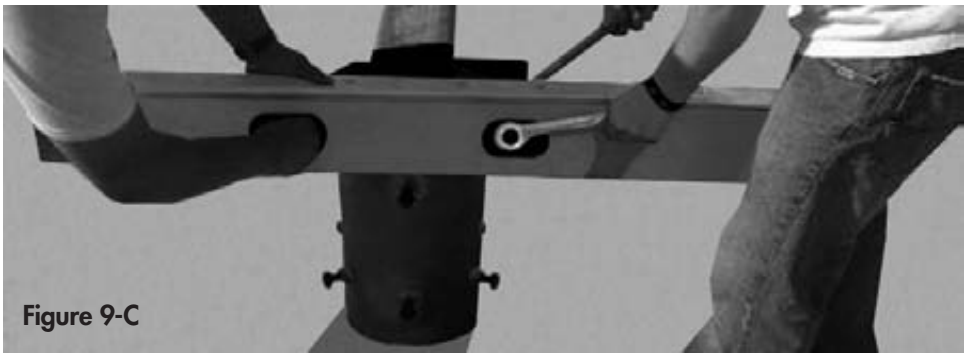


Figure 9-C

Step 8

Install Two Universal Brackets (7542460) using (8) x 3/4-10 hardware. Tighten bolts per ASTM A325 procedures.

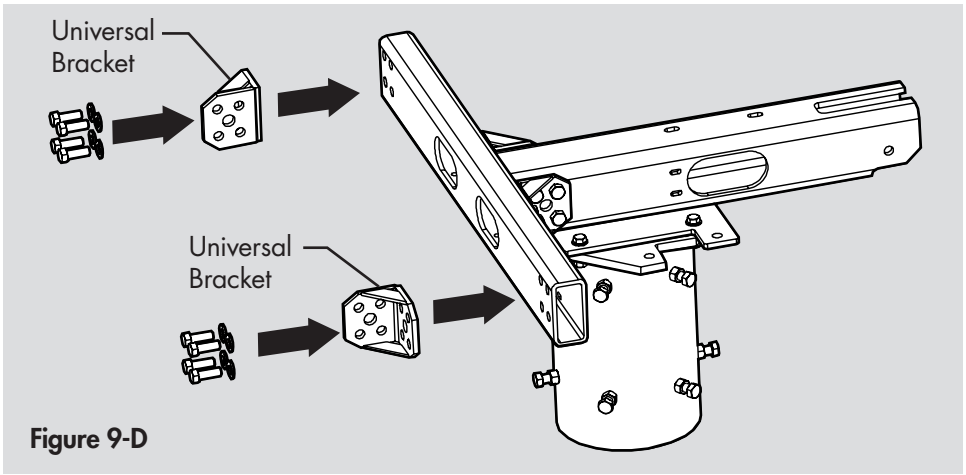


Figure 9-D

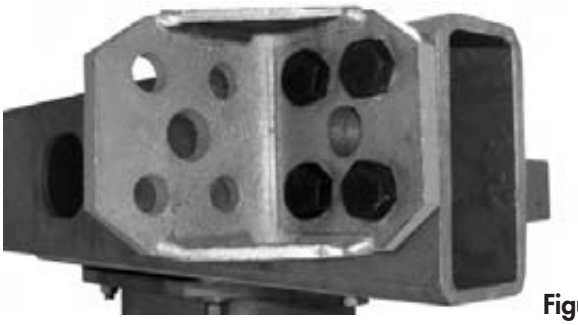


Figure 9-E

Detail View of Installed Universal Bracket

Installation Procedures

Step 9

IInstall fine azimuth adjustment rod using two spherical rod ends (7542639) and 3/4-16 nuts. Level the rod using 3/4-16 adjustments nuts. Hand tighten the hardware.

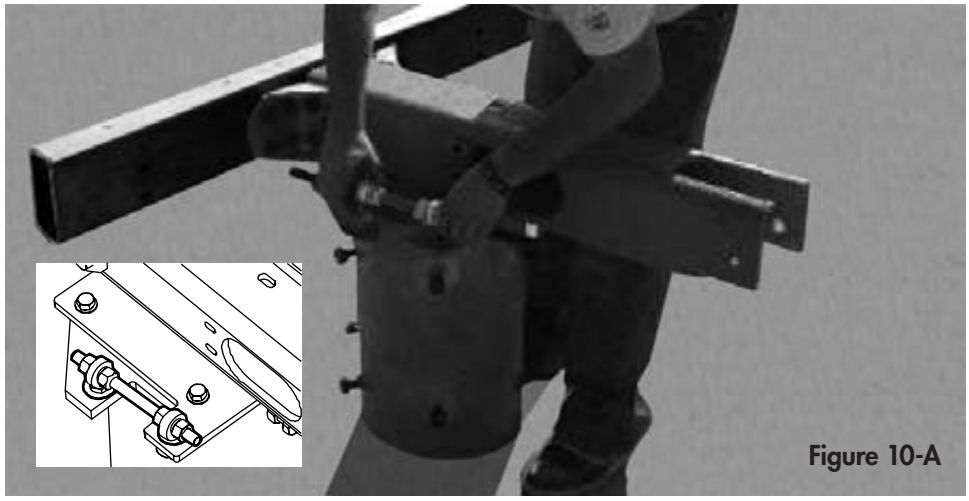


Figure 10-A

Figure 10-B

Step 10

Install Elevation Pivot Bracket (7542693) using 3/4-10 hardware. Hand tighten hardware.

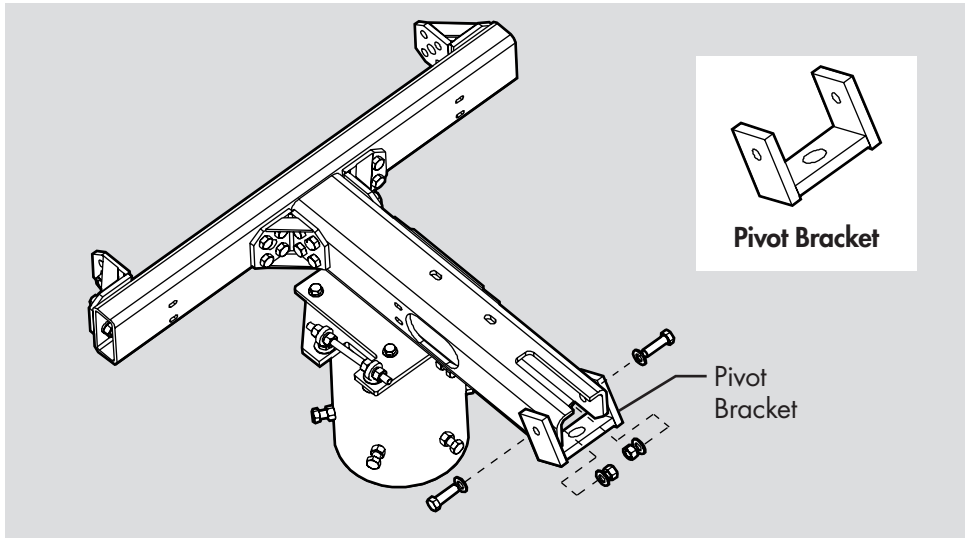


Figure 10-C

Installation Procedures

Pedestal Mount

The elevation/azimuth mount design simplifies installation, minimizes foundation requirements, and enables horizon-to-horizon coverage from any worldwide location. The ground mount assembly enables 180 degree positioning for selected azimuth viewing. Azimuth range coverage is plus or minus 90 degrees, divided into three 120 degree continuous ranges with a 30 degree overlap. Elevation adjustment is continuous from 0 degrees to 90 degrees.

After ensuring that the foundation has been properly prepared, the ground mount assembly process may begin.

Unpacking

The pedestal ground mount assembly arrives in a packaged wooden crate as shown in Figure 11 below. The mount can be positioned manually or by using a crane; however, Andrew recommends that this procedure be performed using a crane to ensure speed and ease of installation.

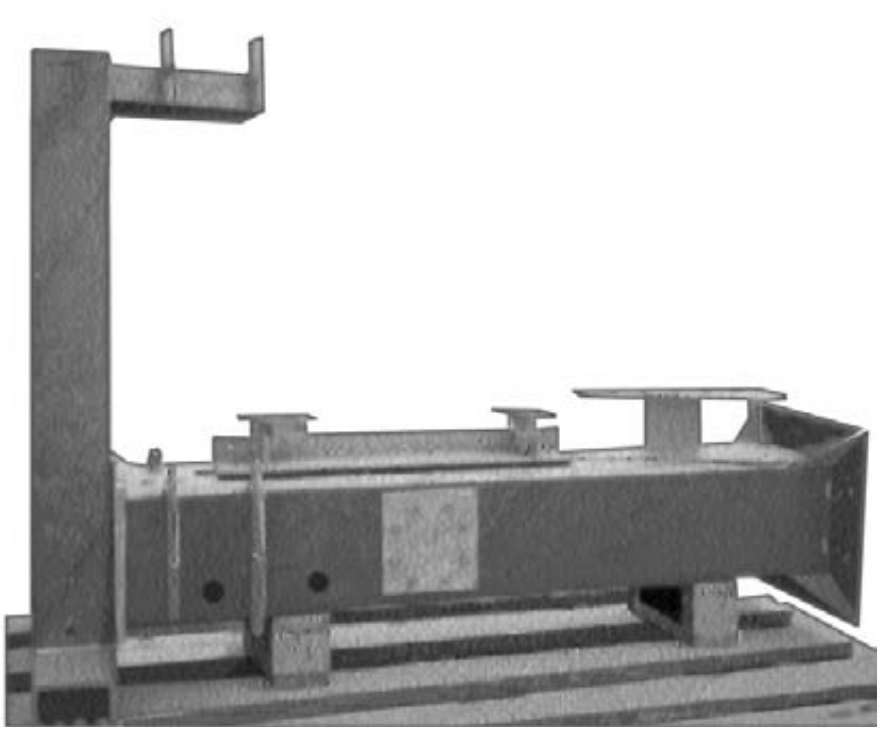


Figure 11

Assembly (Using a Crane)

As stated previously, the pedestal ground mount installation process can be conducted manually or by using a crane. The following steps provide the necessary procedures for installing the ground mount assembly using a crane.

Installation Procedures

Step 1

Carefully remove the ground mount assembly (P/N 208800 - motorizable or P/N 202680-2 manual) from the packing crate. Leave the steel strapping intact to avoid disengagement of the panning frame from the square-tube weldment during the ground mount installation.

Step 2

Securely attach the crane to the ground mount assembly using a sling, and carefully raise the entire ground mount as shown in Figure 12.

Figure 12

Step 3

Align the ground mount assembly directly over the anchor bolts, which should have been previously mounted in the foundation pad.

NOTE: Ground mount positioning on the foundation is dependent upon predetermined azimuth viewing requirements. The ground mount assembly arm should be positioned opposite the satellite requirement. If your site is in the Northern hemisphere, your satellite will be located in the South. If your site is in the Southern hemisphere, your satellite will be located in the North.

Step 4

Lower the ground mount assembly onto the anchor bolts with the corresponding hole pattern.

Installation Procedures

Step 5

Attach the ground mount assembly to the eight corresponding anchor bolts using a 3/4 inch flat washer and 2-3/4 inch hex nuts. One 3/4 inch hex nut is supplied with the anchor bolt kit and the second 3/4 inch hex nut is supplied with the antenna.

Step 6

Remove the steel strapping from the ground mount assembly.

Step 7

Tighten the foundation hardware using the A-325 tensioning procedure.

Figure 13 shows the ground mount assembly attached to the foundation

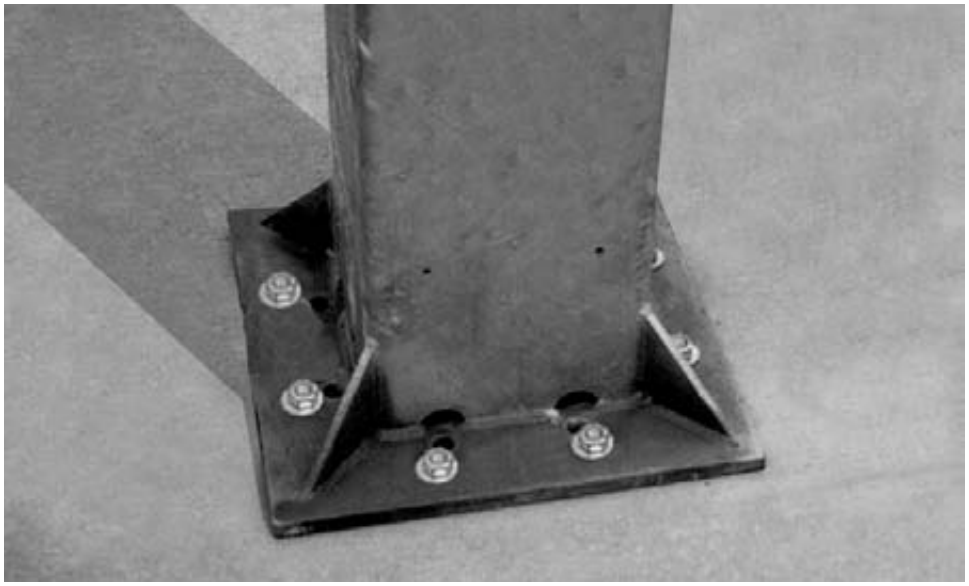


Figure 13

Installation Procedures

Assembly (Without a Crane)

As stated earlier, Andrew recommends the use of a crane during this installation process; however, we recognize that a crane may not always be available. If a crane is not available, the following steps provide the procedure for installing the ground mount assembly without a crane.

Step 1

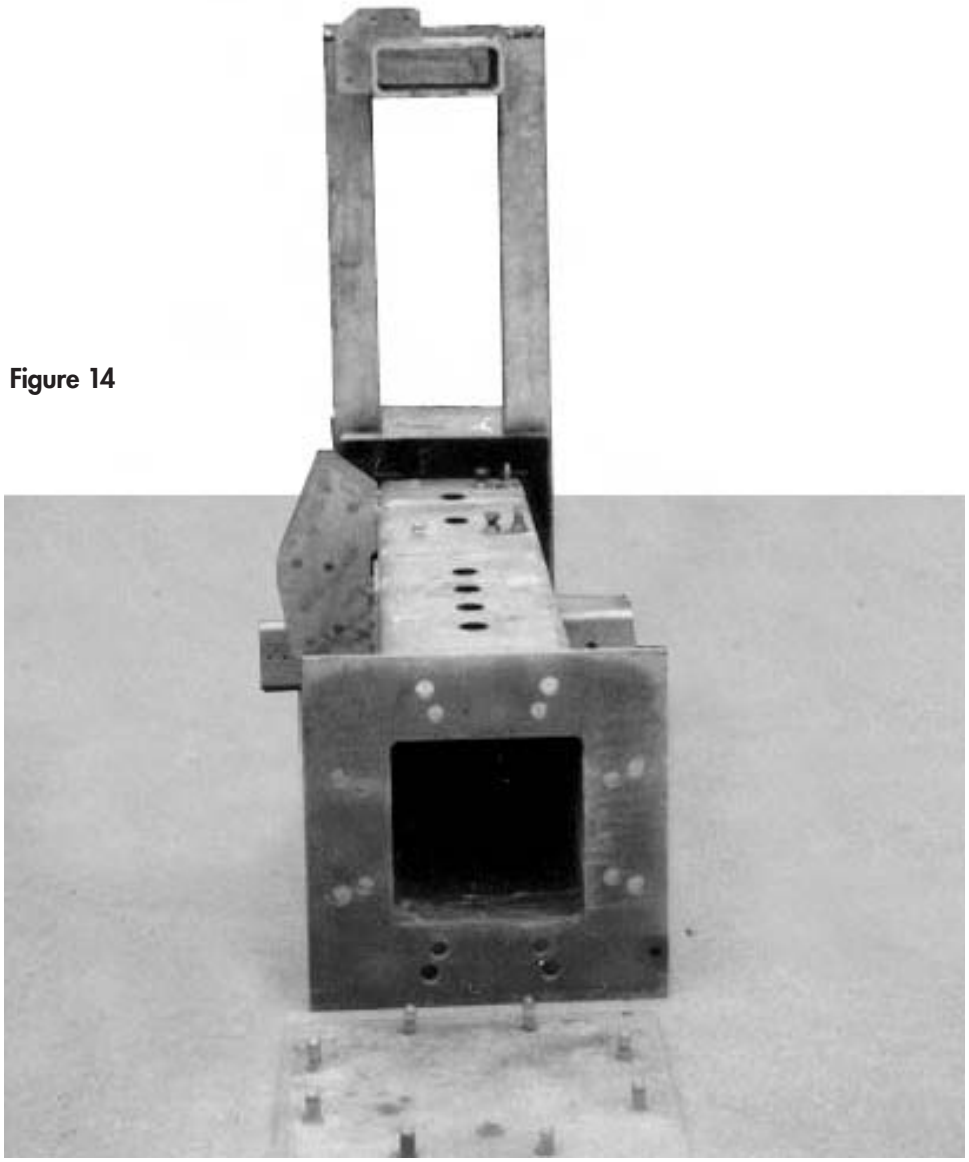
Carefully remove the ground mount assembly (P/N 208800-motorizable or P/N 202680-2- manual) from the packing crate. Leave the steel strapping intact to avoid disengagement of the panning frame from the square-tube weldment during the ground mount installation.

Step 2

Lay the ground mount assembly on its side, in line with the anchor bolts (P/N 203314-manual or P/N 203666-motorizable) as shown in Figure 14.

NOTE: Ground mount positioning on the foundation is dependent upon predetermined azimuth viewing requirements. The ground mount assembly panning-frame arm should be opposite of the satellite requirement. If your site is in the Northern hemisphere, your satellite will be located in the South. If your site is in the Southern hemisphere, your satellite will be located in the North.

Figure 14



Installation Procedures

Step 3

Lift the ground mount assembly into an upright position. In the absence of a crane, it is recommended that a minimum of two people assist in the lifting of the mount assembly as shown in Figure 15 and Figure 16.

Figure 15

Figure 16

Be very cautious when lowering the mount. Do not lower the mount onto your feet.

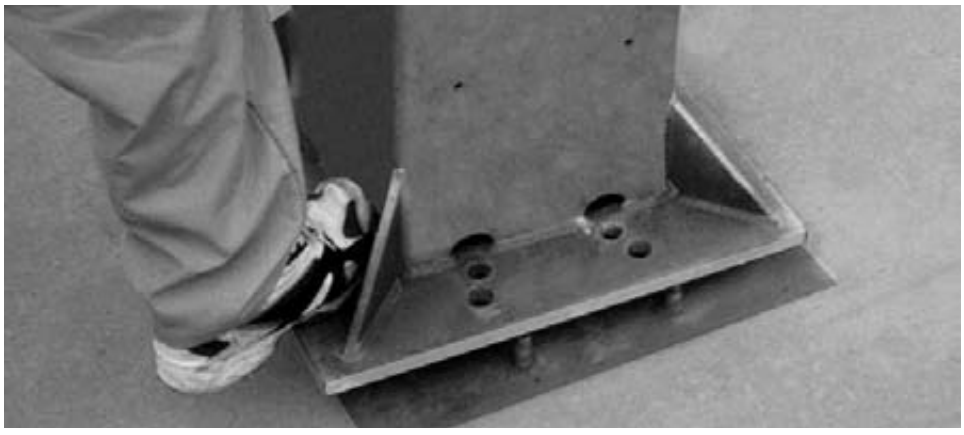


Figure 17

NOTE: You may need to adjust the mount when lifting it to ensure that the anchor bolts are aligned directly underneath the base of the ground mount assembly as shown in Figure 17.

Installation Procedures

Step 4

Attach the ground mount assembly to the eight corresponding anchor bolts using a 3/4 inch flat washer and 2-3/4 inch hex nuts. One 3/4 inch hex nut is supplied with the anchor bolt kit and the second 3/4 inch hex nut is supplied with the antenna.

NOTE: Ground mount positioning on the foundation is dependent upon predetermined azimuth viewing requirements. The ground mount assembly arm should be opposite the satellite requirement. If your site is in the Northern hemisphere, your satellite will be located in the South. If your site is in the Southern hemisphere, your satellite will be located in the North.

Step 5

Remove the steel strapping from the ground mount assembly.

Step 6

Tighten the foundation hardware using the A-325 tensioning procedure.

Figure 18 shows the ground mount assembly attached to the foundation

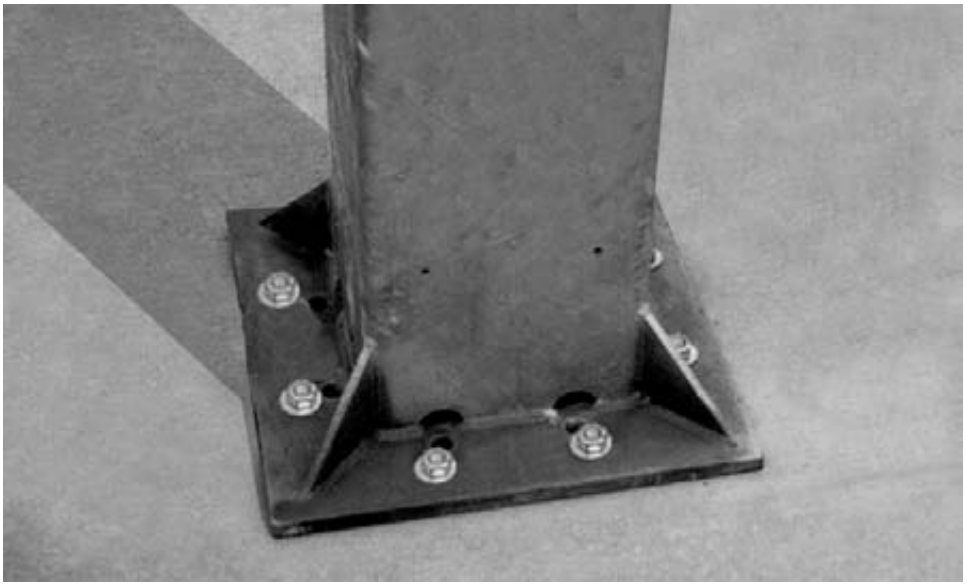


Figure 18

Installation Procedures

Manual Pedestal Ground Mount Assembly

Step 1

Prepare the ground mount hardware in the mount hardware kit by sorting all bolts, nuts, and flat washers into separate sections as shown in Figure 19.

Figure 19

Step 2

Wax two sides of each galvanized bolt with the stick wax provided. This allows a smooth installation of each galvanized bolt as shown in Figure 20.

Figure 20

Installation Procedures

Step 3

Position and mount the azimuth tiller arm (P/N 203112) to the tiller-arm bracket on the left side (facing the satellite) of the ground mount assembly. This mounting position of the azimuth tiller arm is dependent upon pre-determined azimuth range requirements as shown in Figure 21.

NOTE: The ground mount assembly enables 180 degrees positioning for selected azimuth viewing. Azimuth range coverage is plus or minus 90 degrees, divided into three 120 degree continuous ranges with a 30 degrees overlap. Elevation adjustment is continuous from 0 degrees to 90 degrees.

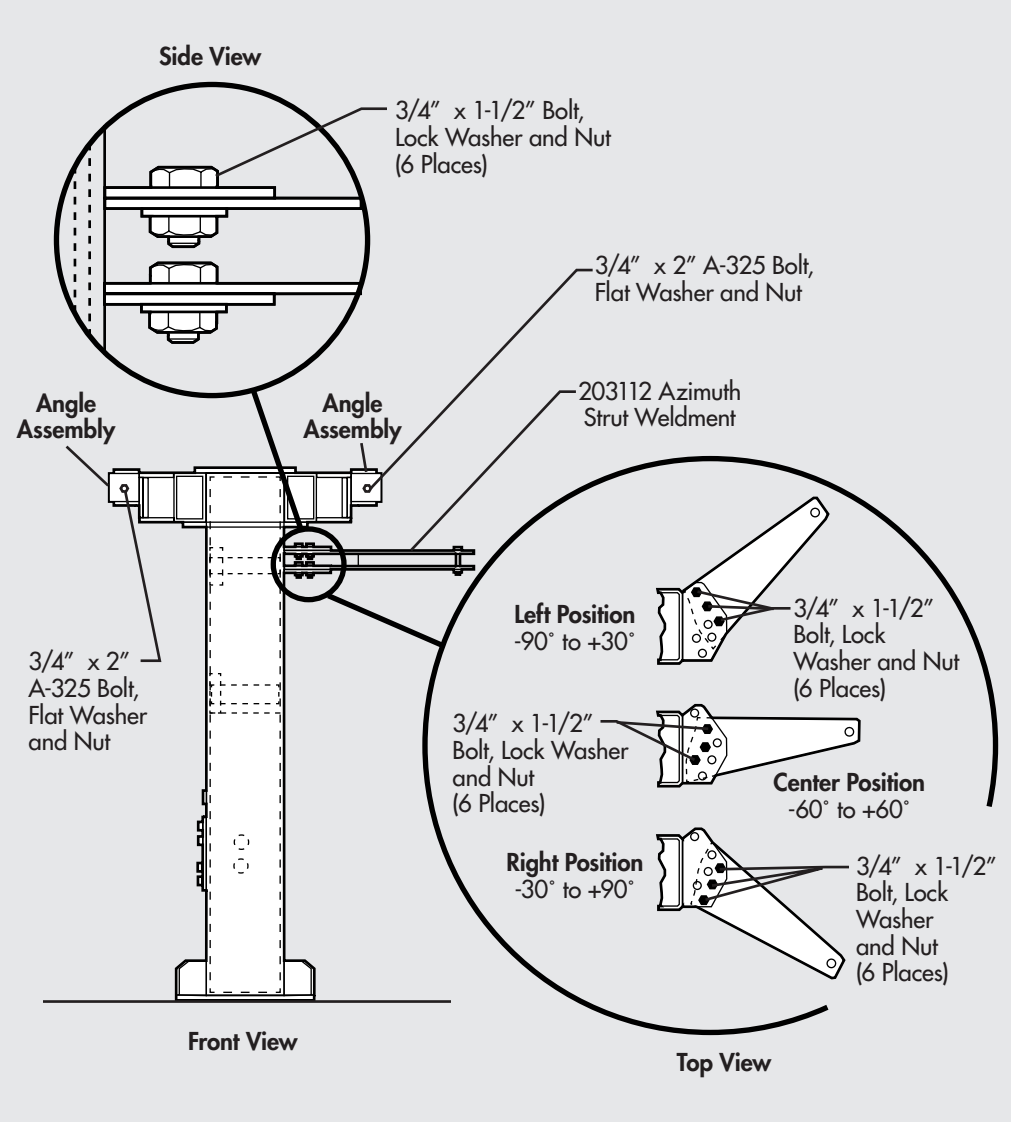

Side View
3/4" x 1-1/2" Bolt, Lock Washer and Nut (6 Places)
3/4" x 2" A-325 Bolt, Flat Washer and Nut
203112 Azimuth Strut Weldment
Angle Assembly
Angle Assembly
3/4" x 2" A-325 Bolt, Flat Washer and Nut
Front View
Left Position -90° to +30°
3/4" x 1-1/2" Bolt, Lock Washer and Nut (6 Places)
3/4" x 1-1/2" Bolt, Lock Washer and Nut (6 Places)
Center Position -60° to +60°
Right Position -30° to +90°
3/4" x 1-1/2" Bolt, Lock Washer and Nut (6 Places)
Top View

Figure 21

Step 4

Tighten the hardware using the A-325 tensioning procedure.

An illustration of the final azimuth tiller arm is shown in Figure 22.

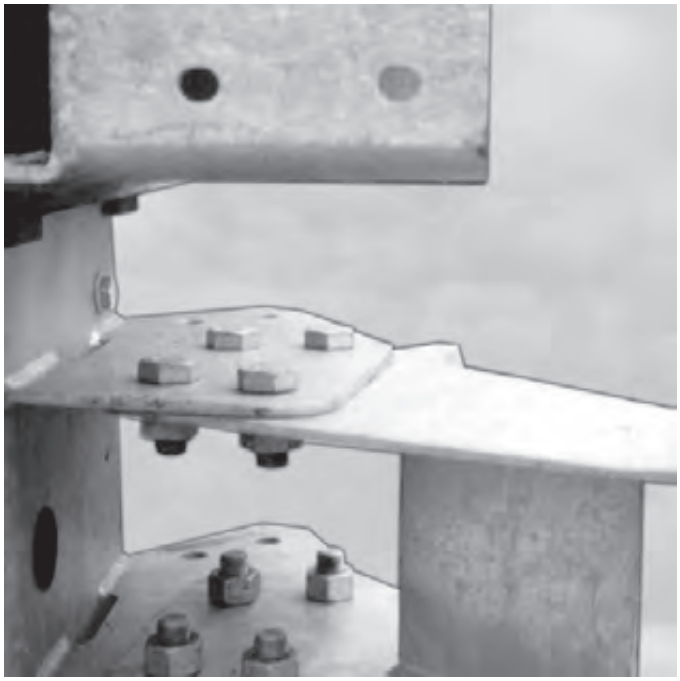


Figure 22

Step 5

Locate the elevation and azimuth struts (P/N 202951-2-manual) as shown in Figure 23.
NOTE: The azimuth strut is the strut pictured on the bottom and the elevation strut is on the top in the illustration below.

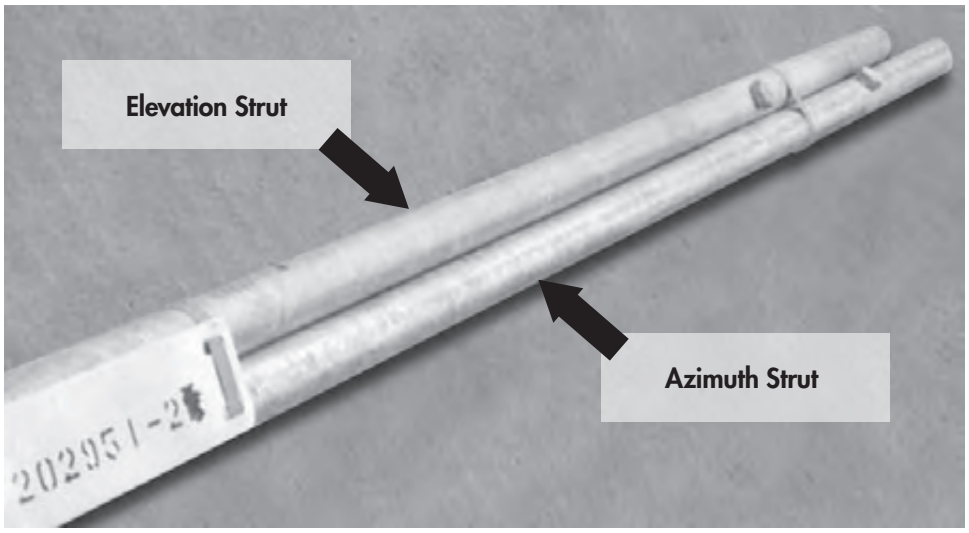


Figure 23

Installation Procedures

Step 6

Insert pivot blocks (P/N 205876) onto the end of the azimuth strut using lubricated 1/2 inch bolt, flatwasher and hex nut as shown in Figure 24. A 3/4 inch flat washer should be inserted between the strut and the spacer block. Tighten hardware according to the A-325 tensioning procedure.

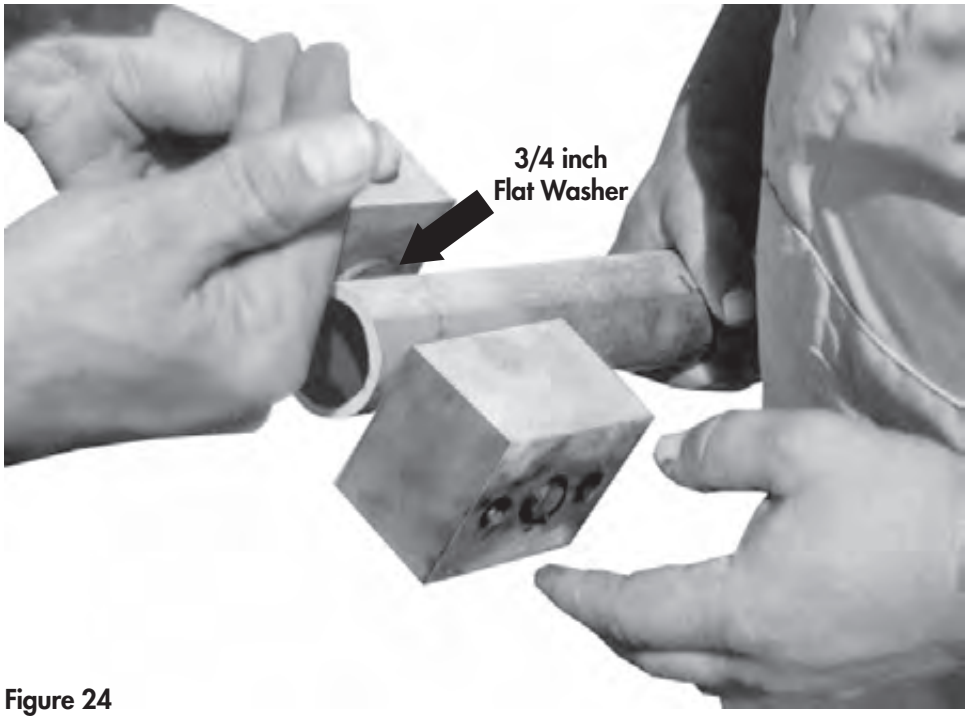


Figure 24

Step 7

Slide the round strut assembly bracket (P/N 203875) on the end of the azimuth strut, and hand tighten the 1/2 inch setscrews before mounting it on the ground mount assembly as shown in Figure 25.

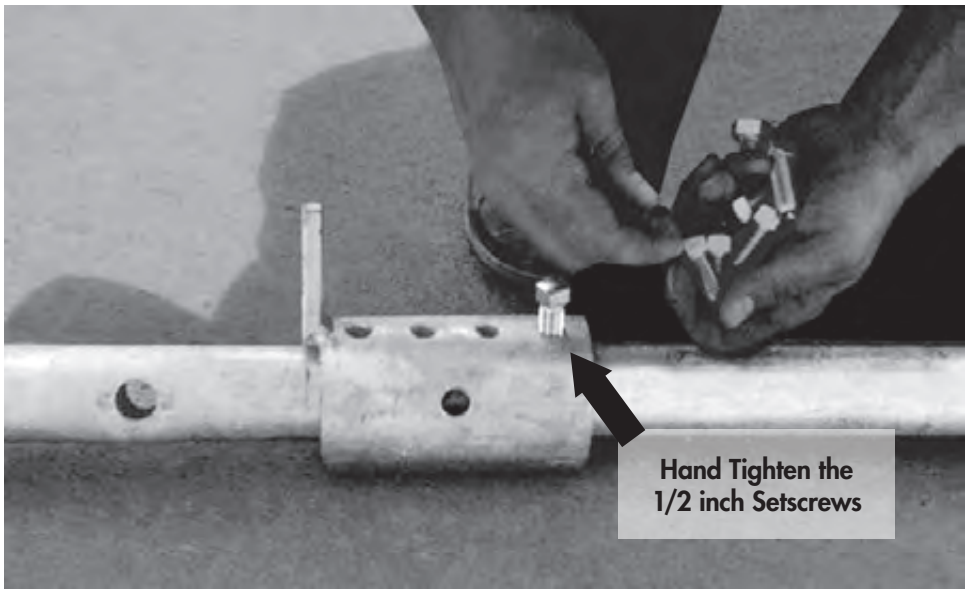


Figure 25

Installation Procedures

Step 8

Mount the second azimuth support plate (P/N 205875) pivot assembly to the rear end of the ground mount assembly as shown in Figure 16. Spacer blocks (P/N 205874) and 5/8 inch hardware (hex bolt, flatwasher, hex nut) should be inserted as shown in Figure 26.

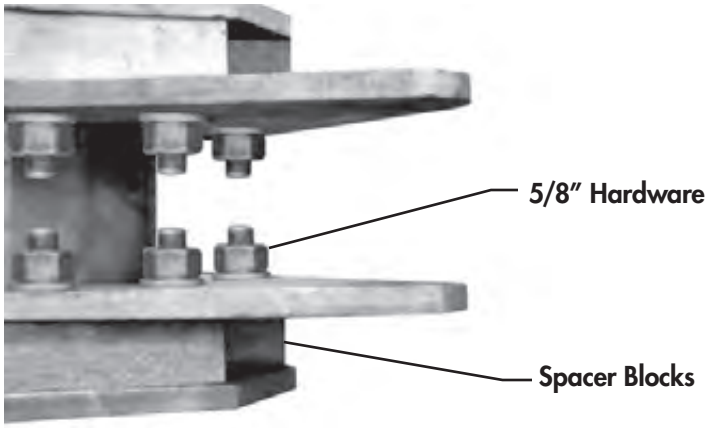


Figure 26

Step 9

Mount the azimuth strut to each bracket on the ground mount assembly as shown in Figure 27a and Figure 27b.

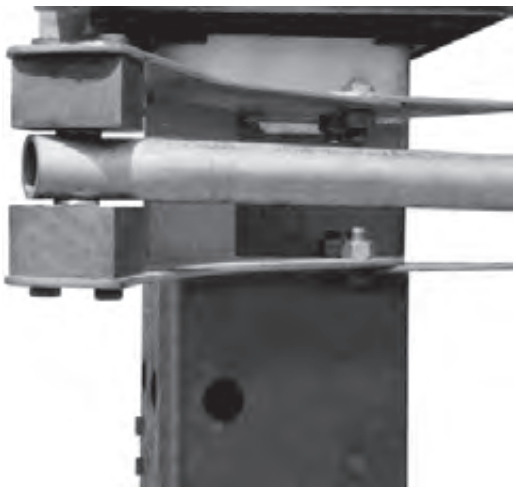


Figure 27-A

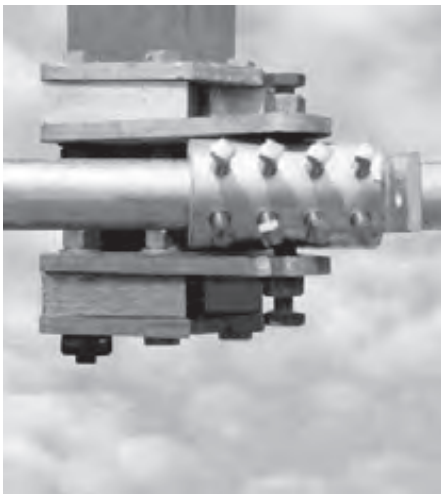


Figure 27-B

Installation Procedures

The front and rear brackets should be aligned as shown in Figure 28. Figure 28 illustrates a final azimuth strut assembly mounted to the ground mount assembly.

Figure 28

Step 10

The next step is to install the elevation strut assembly. Begin by bolting the elevation strut tube assembly (P/N 205872) to the ground mount assembly as shown in Figure 29.

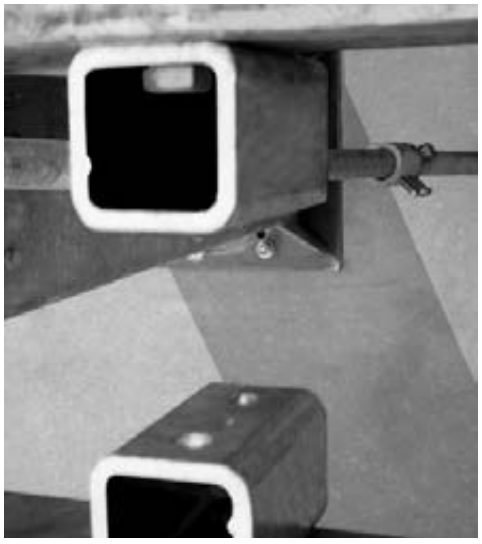


Figure 29 (Top View)

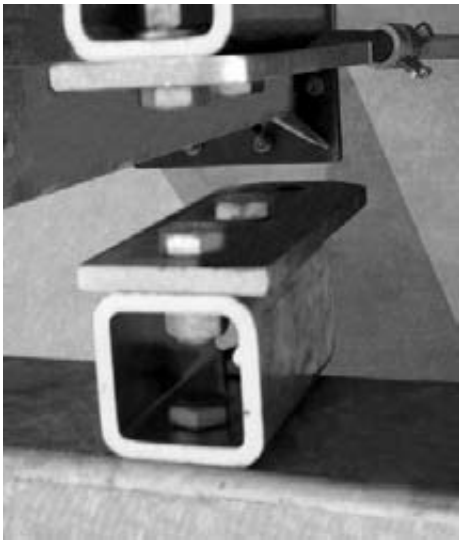


Figure 30 (Top View)

Step 11

Bolt the elevation bracket-support plates (P/N 205873) to the elevation strut tube assembly using 5/8 inch hardware (hex bolt, flatwasher and nut) as shown in Figure 30.

Step 12

The elevation strut tube assembly should now be bolted to the elevation strut bracket.

Installation Procedures

Step 13

The elevation strut tube assembly should now be bolted to the elevation strut bracket as shown in Figure 31 and Figure 32.

Figure 31

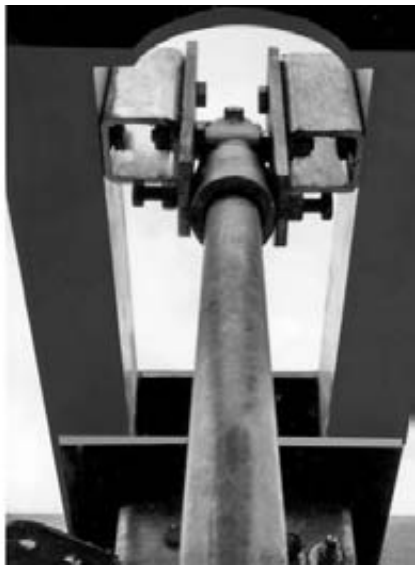


Figure 32

Installation Procedures

Manual Actuator Assembly

The manual actuator assembly (P/N 207882) is used to adjust the elevation and azimuth angles of the 4.0-meter antenna. The following steps provide the procedureused to assemble and install the manual actuator assembly.

NOTE: This assembly should be conducted upon completion of the antenna assembly (after feed assembly). Refer to "Acquiring A Satellite".

Step 1

Loosely attach the manual actuator assembly (P/N 207882) to the elevation strut as shown in Figure 33 using clamp segments, 1/4 inch screw, lockwasher and hex nut in each of the 12 connections.

NOTE: The drain hole should be positioned downward for proper water drainage.

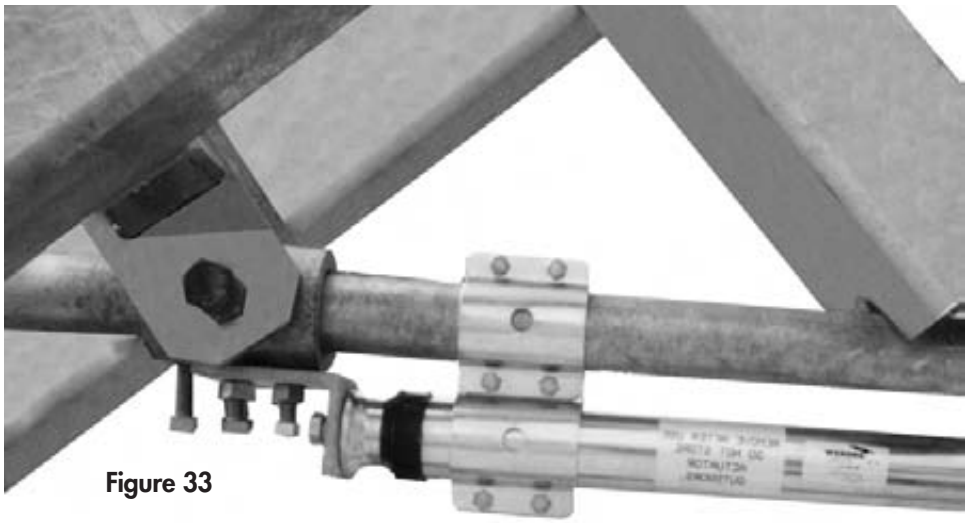


Figure 33

Step 2

Attach the base angle to the actuator (P/N 202661) using 1/2 inch screws, flatwashers and hex nuts as shown in Figure 34. AVOID EXCESSIVE TORQUE ON THE MOUNTING HARDWARE.

Step 3

Ensure that the locking strut-support set screw is firmly tightened on the strut assembly as shown in Figure 34.

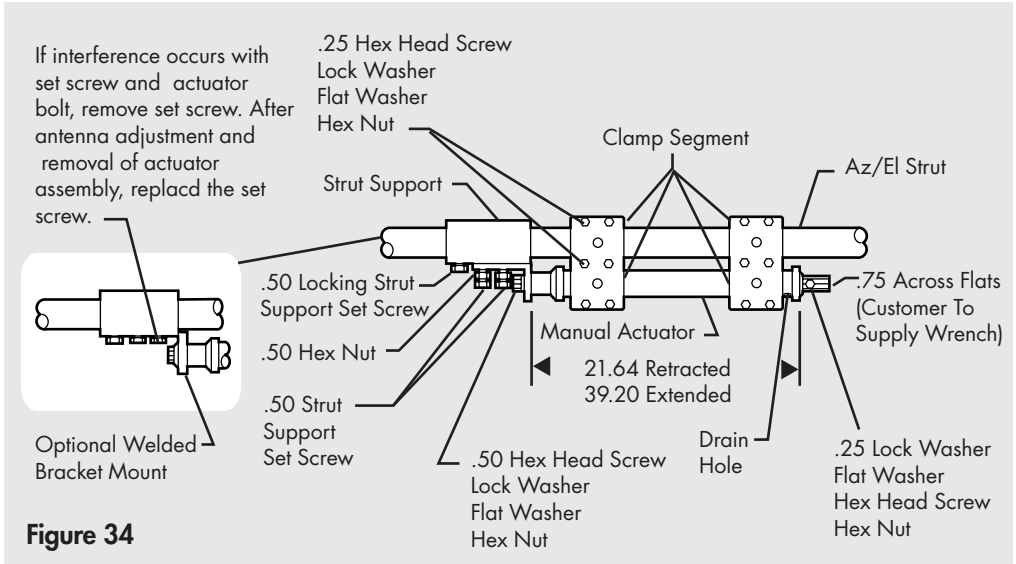


Figure 34

Installation Procedures

Step 4

Remove the two indicated strut-support setscrews, and attach the base angle to the corresponding strut support using the supplied 1/2 inch clamping nuts and the previously removed strut-support setscrews as shown in Figure 34.

WARNING: Azimuth brakes have been factory set. Do not readjust brakes to facilitate the use of actuators.

Step 5

Securely tighten the remaining mounting hardware to achieve the clamping force.

Step 6

Follow directions for "Acquiring a Satellite".

Step 7

Repeat the entire procedure for the remaining strut assembly.

Manual Acturator Assembly Removal

After the adjustments have been made, the manual actuator should be removed. The following steps provide the procedure for the proper removal of the manual actuator assembly.

Step 1

Remove the manual actuator assembly by first removing the hardware securing the actuator to the base angle.

NOTE: The adjustment kit assembly should be removed after the antenna has been adjusted. Store the manual actuator assembly and the corresponding hardware in a dry area for future use.

Step 2

Remove the remaining clamp segments with the corresponding hardware.

Step3

After the antenna is pointed at the satellite, tighten all azimuth and elevation set screws to 35 foot-pounds.

Motorizable Pedestal Ground Mount Assembly

If you are assembling a motorizable pedestal mount (P/N 208800) follow the directions for ground mount assembly before beginning this section. The following steps provide the procedure for assembling the motorizable pedestal ground mount.

Step 1

Bolt the azimuth pivot assembly (top and bottom) brackets to the ground mount assembly using 5/8 inch hardware (hex bolt, flatwasher and hex nut) as shown in Figure 35.

Figure 35

Step 2

Bolt one jack to the azimuth pivot assembly using 5/8 inch hardware (hex bolt, flatwasher and hex nut) as shown in Figure 36.

Figure 36

Step 3

Unscrew the jack using a spud wrench until it meets with the front azimuth strut weldment as shown in Figure 37

Figure 37

Installation Procedures

Step 4

Place pivot blocks (P/N 205876) on both sides of the jackscrew ends, bolting with lubricated 1/2 inch hex bolt, flatwasher and hex nut as shown in Figure 38

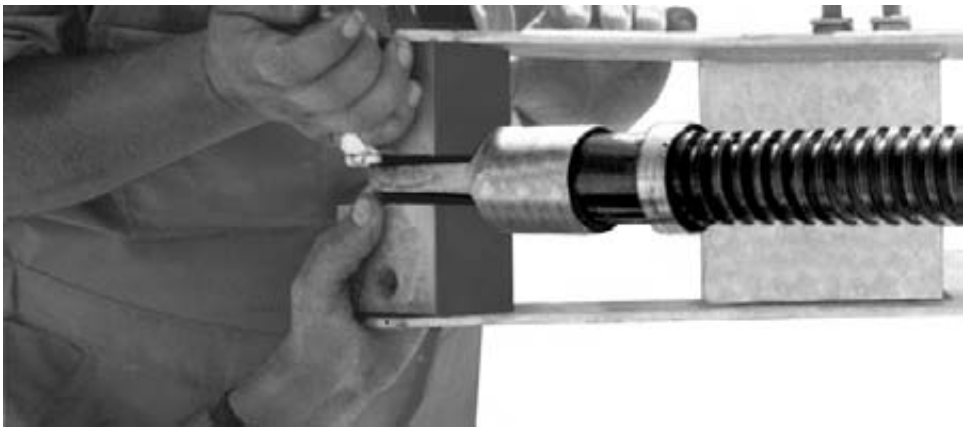


Figure 38

Step 5

Tighten the hardware using the A-325 tensioning procedure.

Step 6

Lubricate the jackscrews according to the maintenance instructions.

Step 7

Pull the protective boot over the jackscrew, and clamp at the end as shown in Figure 39.

Note: Position condensation drain holes downward.

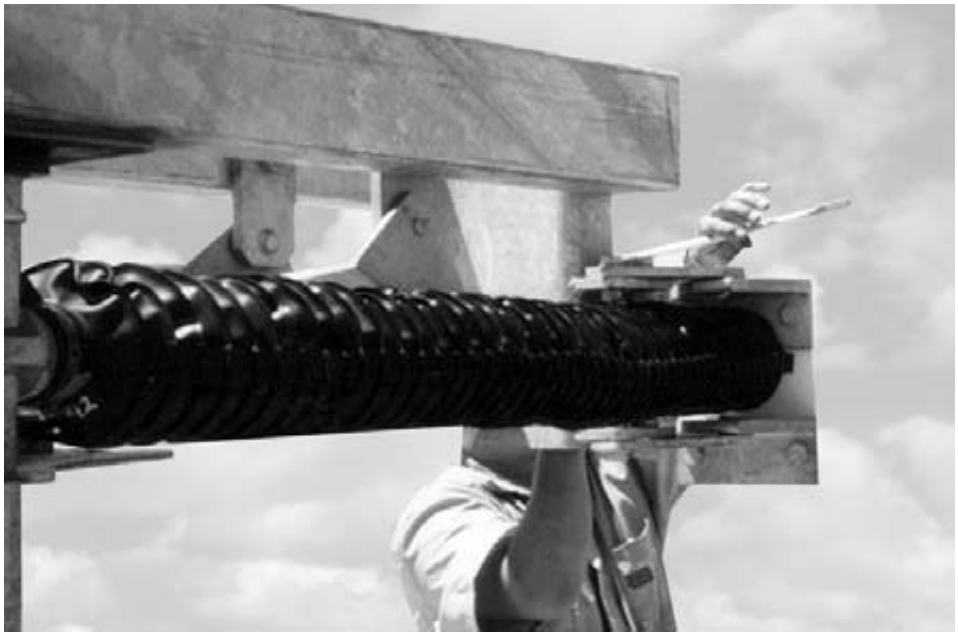


Figure 39

Installation Procedures

Step 8

Bolt the elevation pivot assembly brackets (P/N 208370 - left and P/N 208371 - right) to the inside of the ground mount assembly as shown in Figure 40.

Figure 40

Step 9

Bolt the jack to the elevation pivot assembly using 5/8 inch hardware (hex bolts, flat washers and nuts) as shown in Figure 41a and b.

Figure 41a

Figure 41b

Step 10 Loosen the clamp on the jack boot.

Step 11 Unscrew the jack by using a spud wrench until the jack connects to the back of the enclosure as shown in Figure 42.

Figure 42

Step 12 Tighten the hardware using the A-325 tensioning procedure.

Step 13 Lubricate the jackscrews using the maintenance procedures.

Step 14 Pull the protective boot over the jackscrew, and clamp it at the end as was performed with the azimuth jackscrew.

The ground mount assembly is now completed with the necessary operational essentials. All ground mount options (such as motors) have separate instructional bulletins located in the parts kit that contains the option.

The next step in the installation process is the reflector assembly. Proceed to the next section if you are installing the ES40C-1, ES40K-1, ES40CM-1, ES40KM-1 earth station antenna.

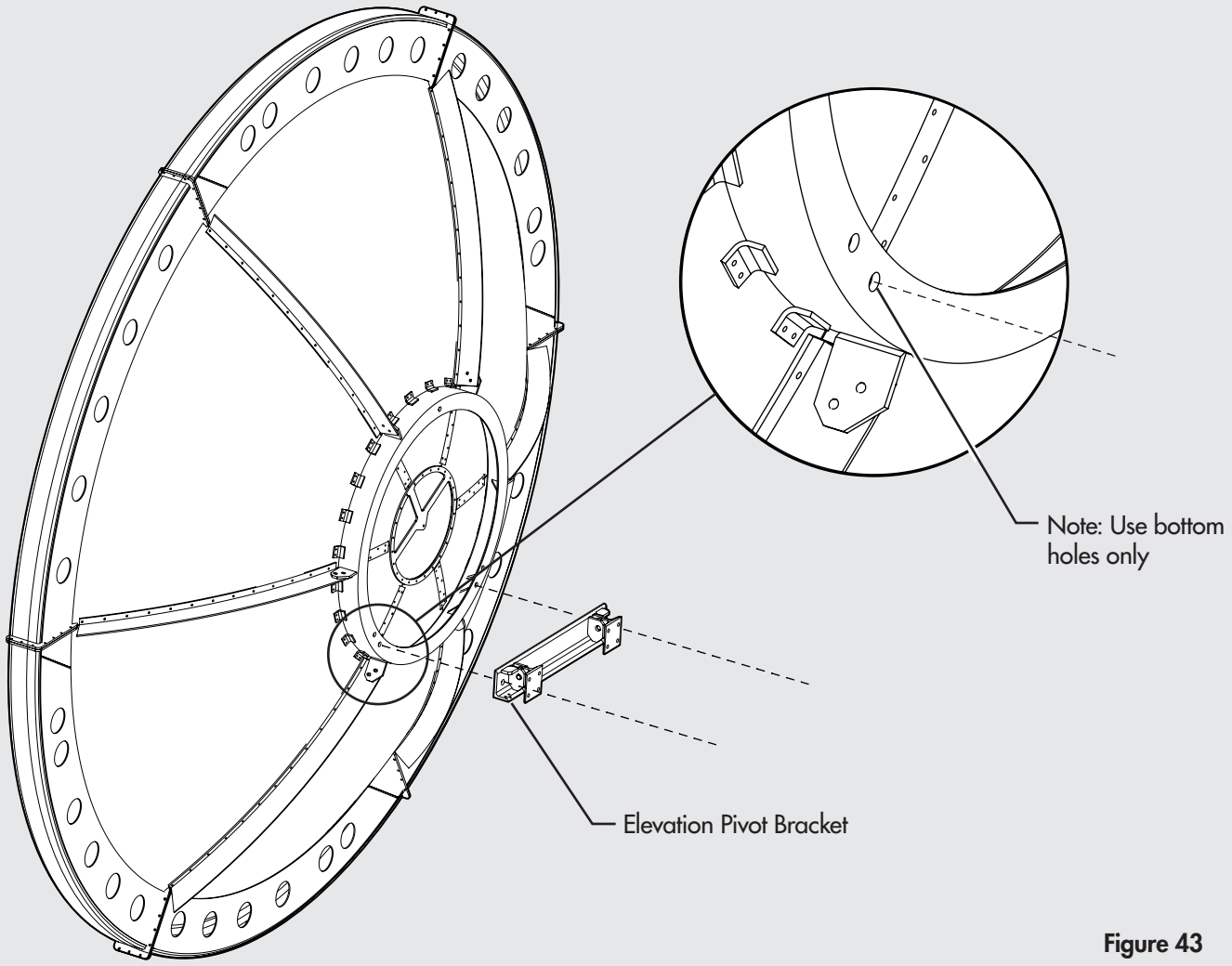


Figure 43

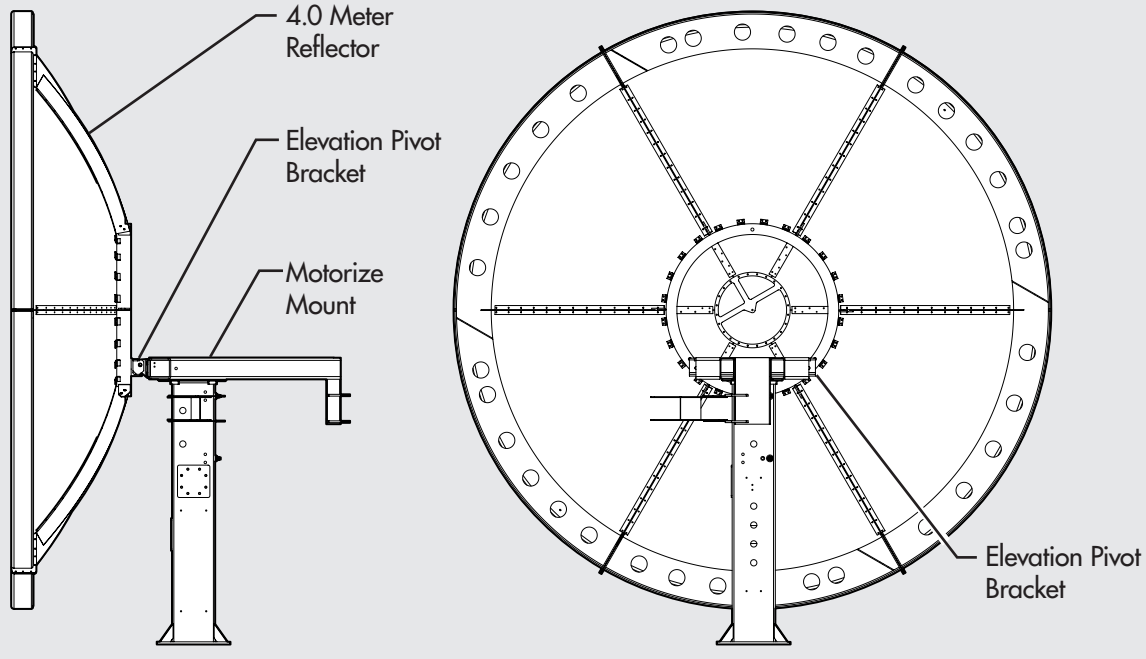


Figure 44

Installation Procedures

ES40C-1 Reflector Assembly

Step 1

Reflector should be assembled on a clear, flat area in front of the foundation pad. Clear debris from area.

Unscrew the sides and the front of the container.

Figure 45a

Each panel is fastened to the crate braces on top and the bottom by joint plates

Figure 45b

Carefully unscrew each panel from the crate one by one during installation.

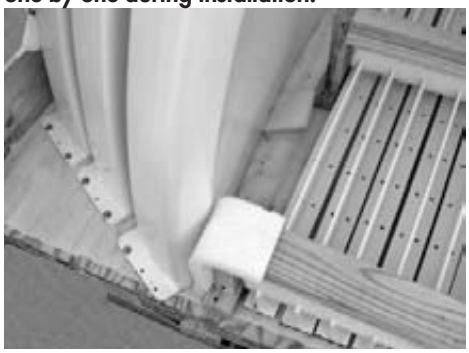


Figure 45c

Figure 45d

Installation Procedures

Step 2

Place plastic sheeting from packing crate as shown in Figure 12. Cut and build center standoff from the cutting marks on the Andrew crate or use custom 34 in brace (standoff) to support center of reflector. Cut from the marks on the Andrew crate outer ring wood supports or use custom 3 in supports for the outer rim of the reflector (3 supports per panel piece). It is desirable that supports will be leveled to allow faster and easier reflector assembly.

Arrange temporary supports as shown in Figure 12.

- Reflector should be assembled in front of foundation pad with bottom of reflector 3 ft from pad
- Supports should be 3-4 in high
- Tie three string levels to opposing blocks across diameter of circle

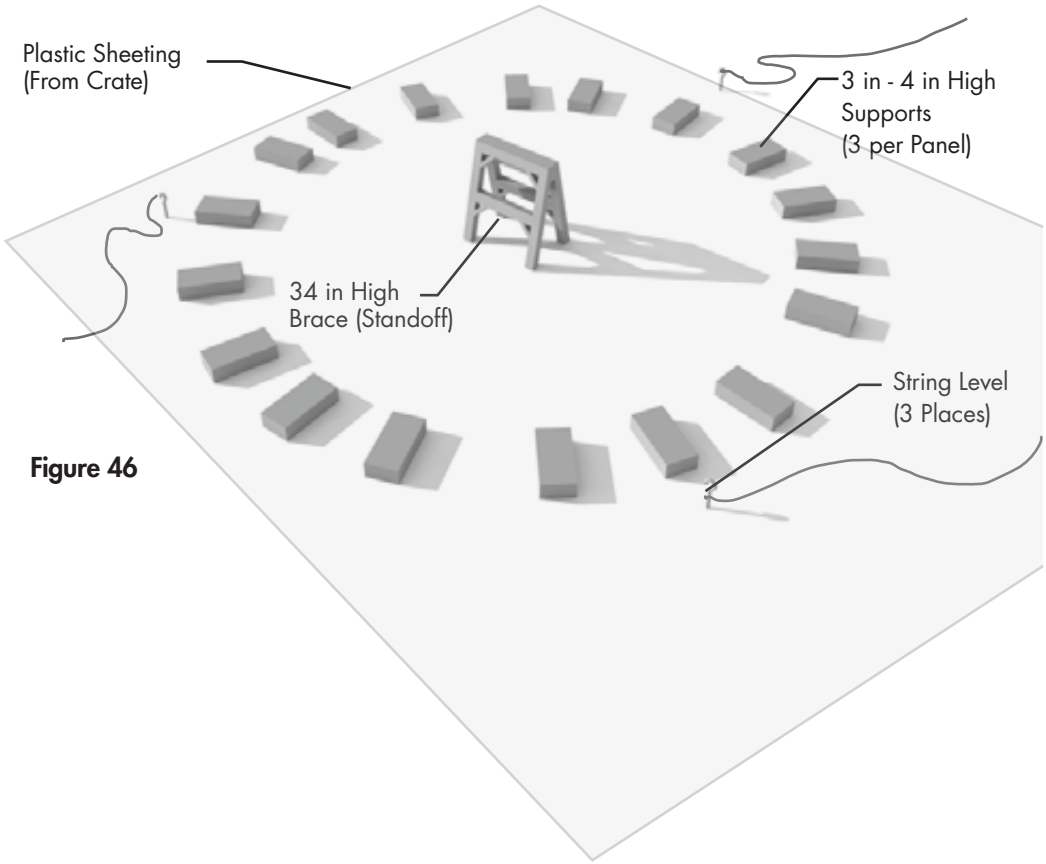


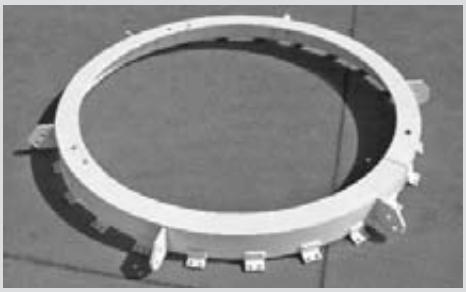
Figure 46

Installation Procedures

Step 3

Identify and orgnaize antenna parts as shown in the following illustrations and photos.
Note: All reflector segments are identified individually by one or two letter designation (A, B, C, D, E, F; A-B, B-C, C-D, D-E, E-F). Locate the markings on the reflector segments in order to assemble the reflector in the proper sequence. See Figure 14 for parts with stamped I.D. letters

Six Reflector Panels (7541278)



One Mount Ring (7544098)

Six Ribs (7544097)

Figure 47

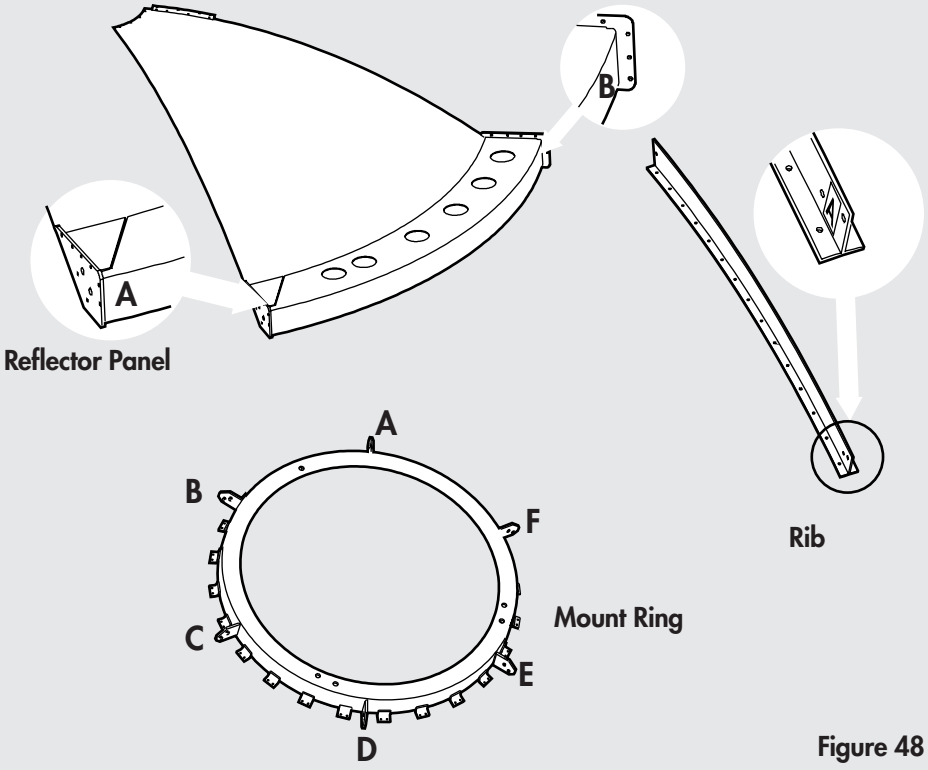
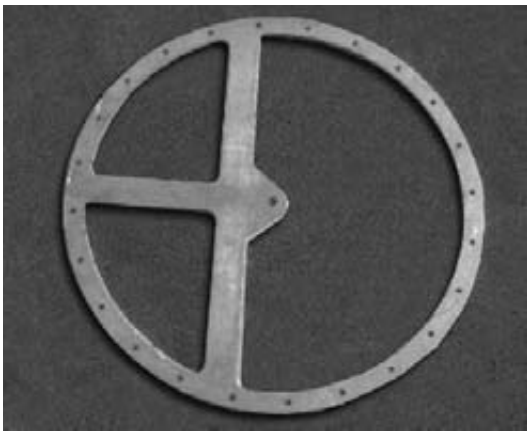


Figure 48

Installation Procedures

The common parts without any identification are as follows:

Figure 49



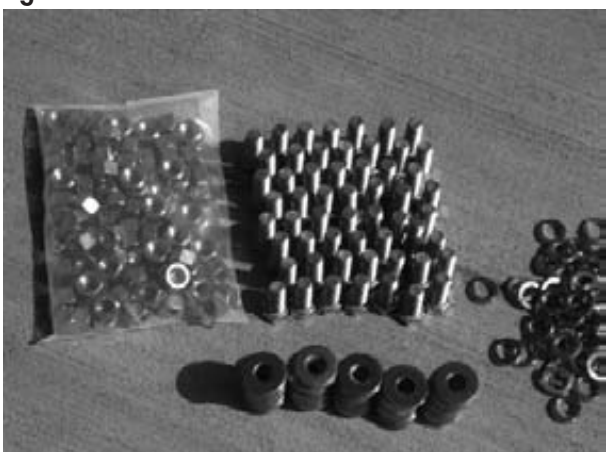
1 Feed Mount Ring (7545392)

Following is the reflector hardware kit:

Figure 50-A

Reflector Hardware Kit

Figure 50-B



Outer Ring Hardware (3/8 -16)

Reflector Panel Hardware (Special Shoulder Bolt)

Figure 50-C

Installation Procedures

Step 4

Place the center of the first panel (7541278) on the 34 inch standoff and outer rim of panel on supporting blocks with concave side down. Place the center of the second panel on the center brace insure that the match-markings are correct. (Ex: A to A, B to B……) as shown in Figures below.

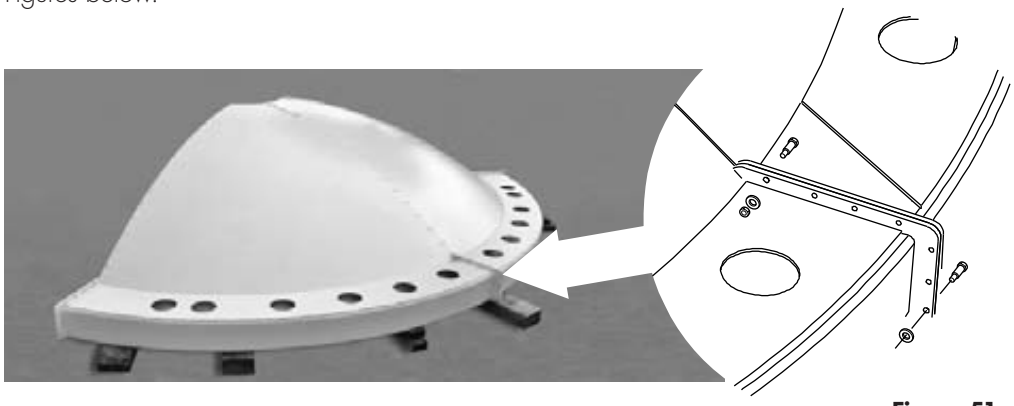
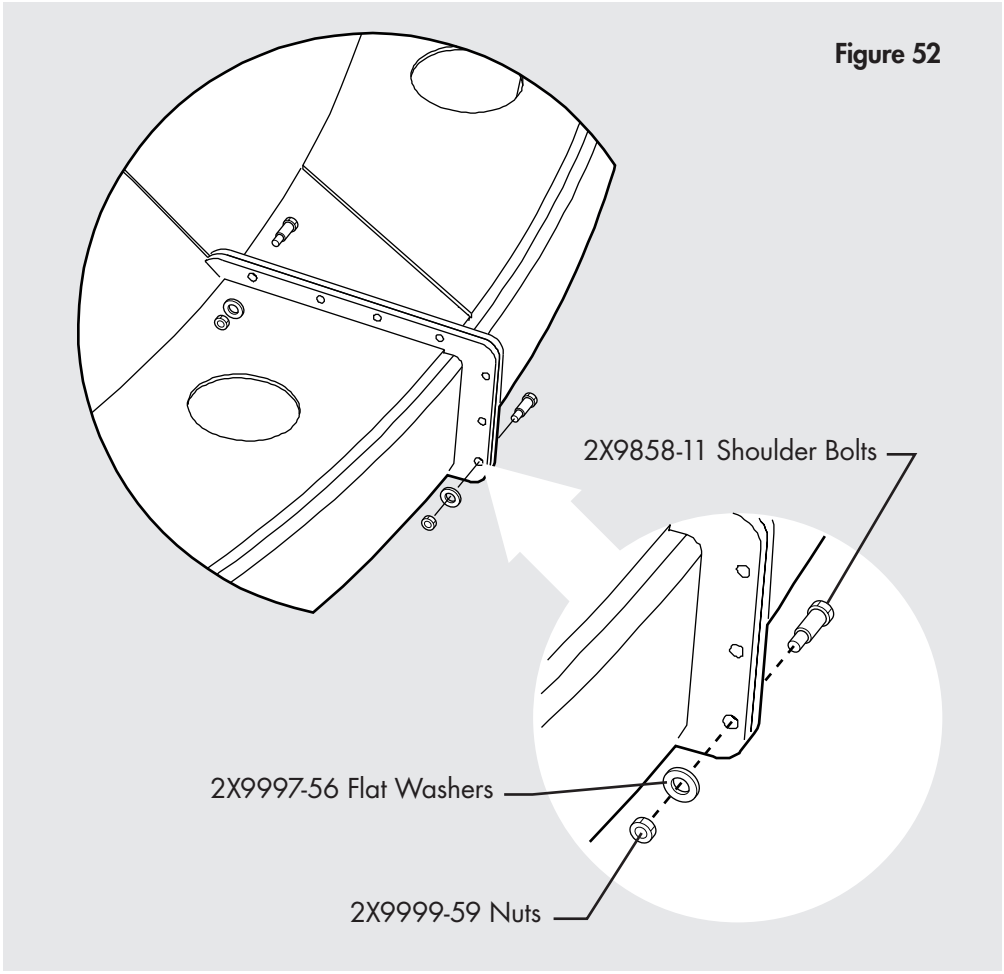


Figure 51

Step 5

Insert and hand tighten special hardware shoulder bolts to the first joint plate connection.

Figure 52



Installation Procedures

Step 6

Insert and hand tighten 2 x 5/16 bolts inside the torsion panel at each joint plate connection.

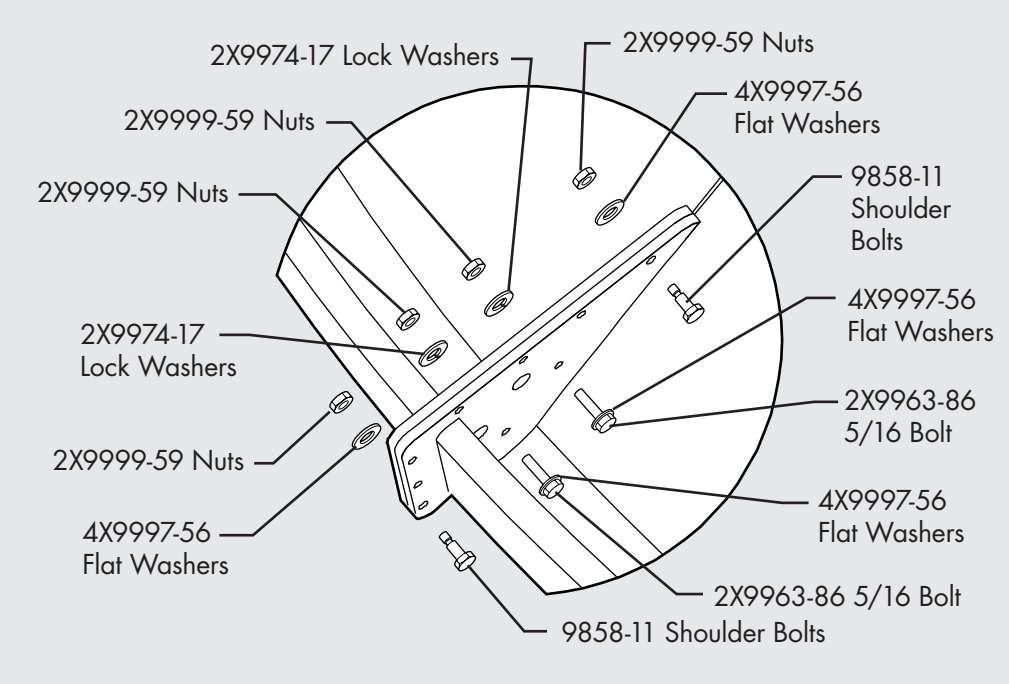


Figure 53

Step 7

Insert and hand tighten 5 x 5/16 bolts outside the perimeter of each joint plate at each connection.

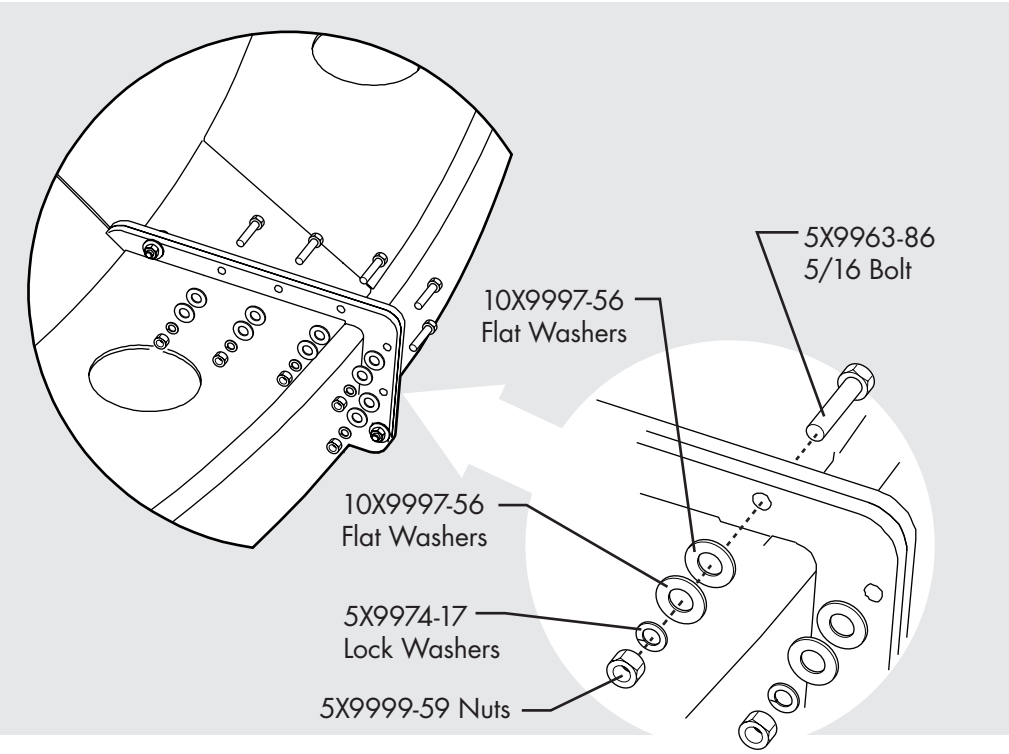


Figure 54

Installation Procedures

Step 8

Place the correct match-marked rib (7544097) on the seam and insert and hand tighten all rib hardware (special shoulder bolt). Insert capscrews from concave side of reflector panels.

Figure 55

Step 9

Install remaining panels and ribs per the previous instructions ***Note:*** *Leave one panel and rib unassembled until ring is in place and assembled.*

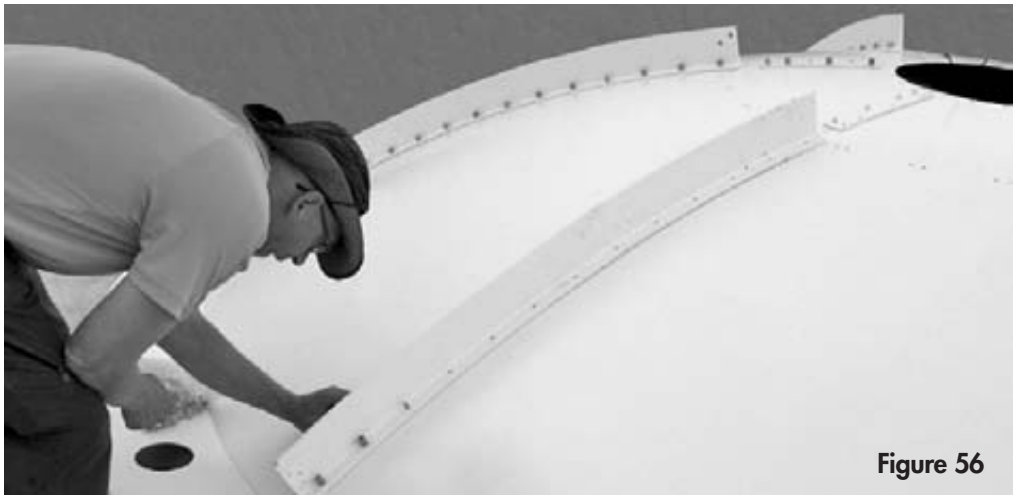


Figure 56

Step 10

Before the last panel is in place, carefully unscrew mount ring (7544098) from the crate - lay center mount ring (7544098) on top of antenna in correct position. Ring is stamped to the ribs marking. You can also slide cone (7545141) under the reflector for future installation or leave it till later feed installation.

Figure 57-A

Installation Procedures

Step 11

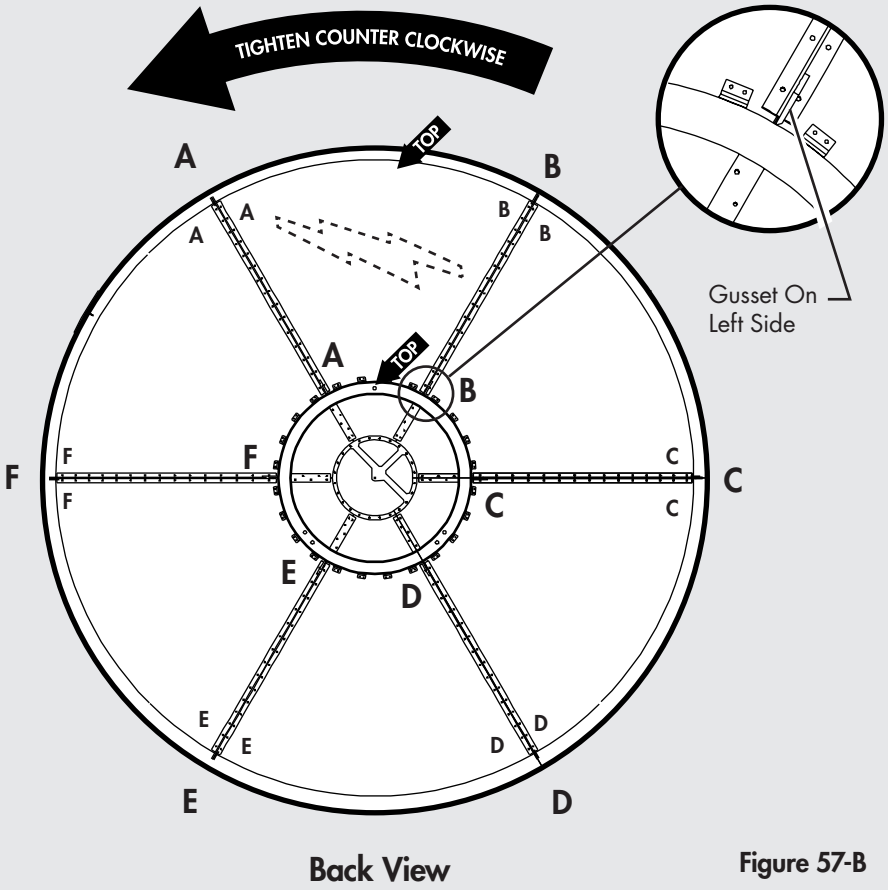


Figure 57-B

Step 12

Install the remaining panel and last rib.

Figure 58

Installation Procedures

Step 13

Start snug tighten all hardware following steps below:

1. All shoulder bolts on all joint plates
2. All inside torsion panels 5/16 bolts on all joint plates
3. All exterior 5/16 bolts on all joint plates
4. Tighten 8 rib bolts (4 at each side) high at a time going around the reflector
5. Tighten all mount ring hardware

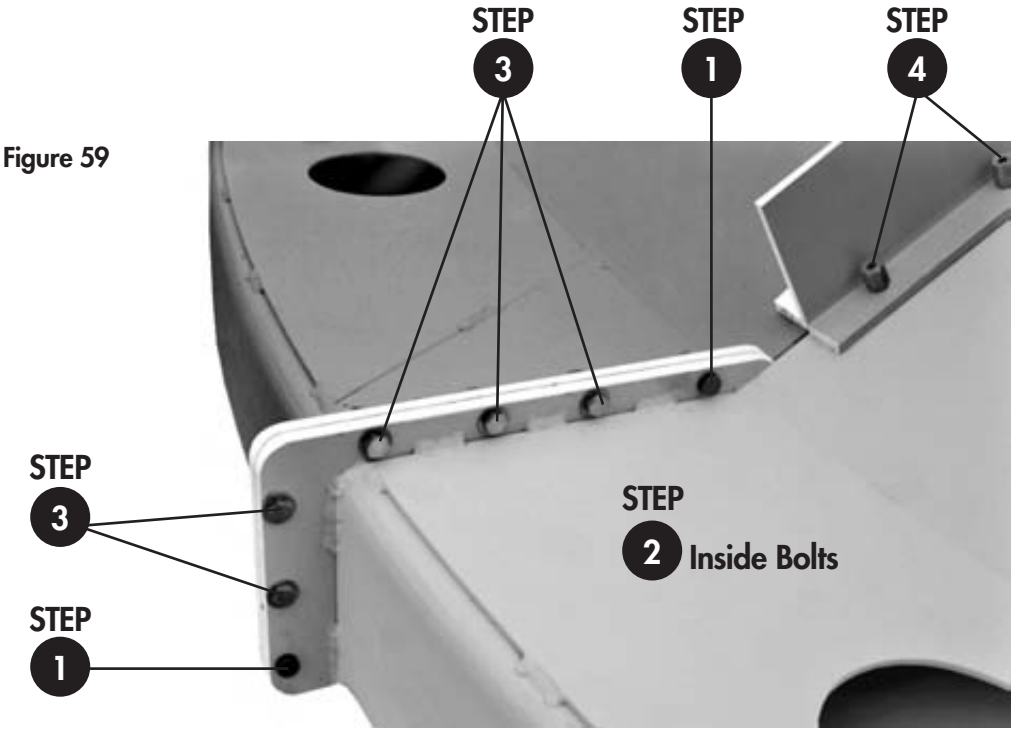


Figure 59

Figure 60

Installation Procedures

Step 14

Install all 3/8-16 hardware between mount ring and ribs, thumb tighten it.

Figure 61

Step 15

After all other hardware is snug tightened - snug tighten 3/8-16 rib to mount ring bolts.

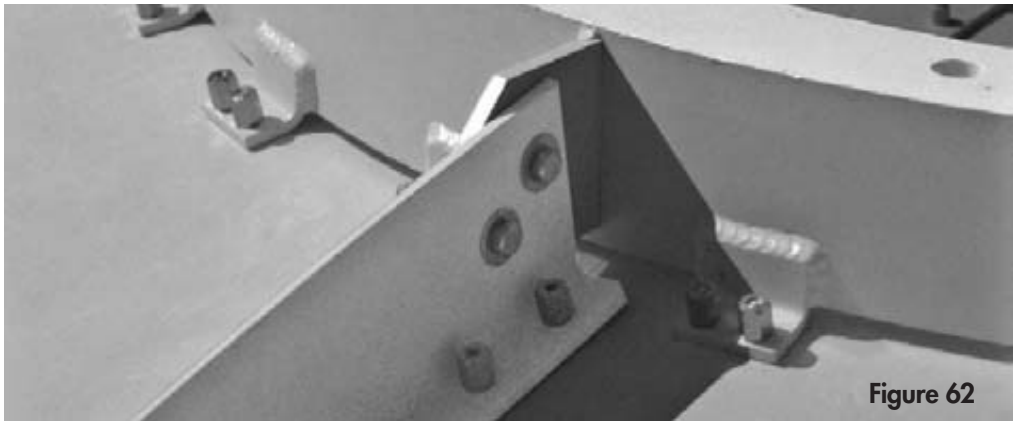


Figure 62

Step 16

Place and fasten feed mount ring (7545392) from outside and cone (7545141) from the inside hand tighten 1/4-20 hardware

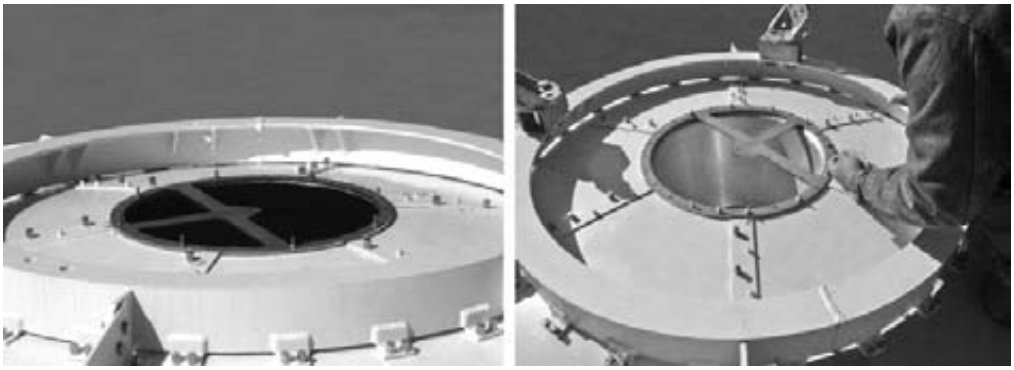


Figure 63

Installation Procedures

Reflector to Mount Assembly

Step 1

Installed last two universal brackets (7542460) on spacers (7545087) with 3/4-10 x 5.0" long hardware. Hand tightened the hardware.

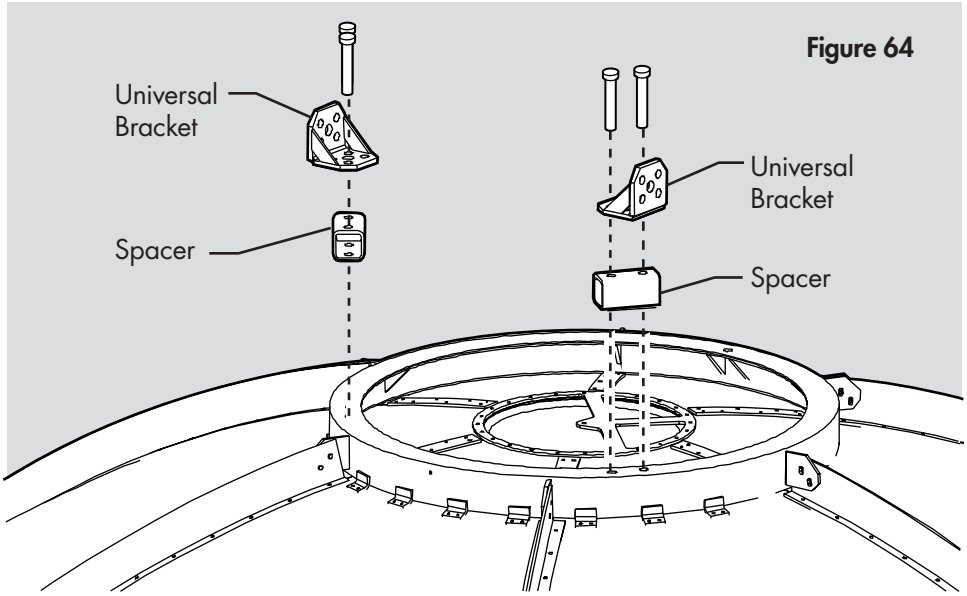


Figure 64

Figure 65

Step 2

Lift the reflector. Position the reflector's universal brackets in place with the mount universal brackets. From the one side of the reflector and mount assembly, drive the 1"-8 bolt through the central hole. Align the universal brackets on the other side of the reflector and add second 1"-8 bolt. Add 1" washers and nuts on both bolts. Hand tighten them.

Figure 66

Installation Procedures

Step 3

Attached the U-bracket (7545088) on the jackscrew (7544729) with the preinstalled and drilled nut (7545089) using 1"-8 x 5" long bolt, washer and nut. Tighten bolts per ASTM A325 procedures. Attached U-bracket (7545088) to the top hole of the reflector mounting ring (7544098) using 3/4-10 hardware.

Figure 67

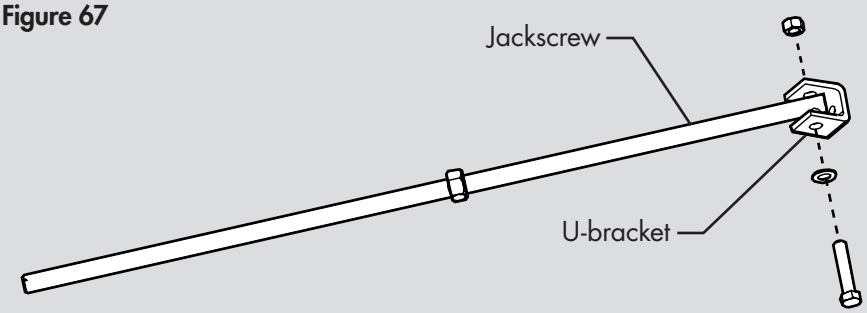


Figure 68

Step 4

Screw 2 x 1.5' nuts and one washers to the opposite side of the jackscrew. Pull jackscrew through the elevation pivot bracket (7542693 see STEP 11). Add 2 more 1.5 nuts and one washer. Snug tighten the nuts.

Step 5

Tighten 3/4"-10 x 5" long bolts from STEP 10 and 3/4-10 bolt from STEP 12 per ASTM A325 procedures.

Step 6

Roughly position the reflector in the required transmitting /receiving sector. Tighten bottom pedestal bolts per ASTM A325 procedures.

Figure 69

Installation Procedures

Step 7

Snug tighten bolt rods jam nuts 3/4-16. Using azimuth 5/8 bolts and azimuth fine adjustment 3/4 screw find transmitting / receiving pick. Tighten azimuth fine adjustment screw to snug.

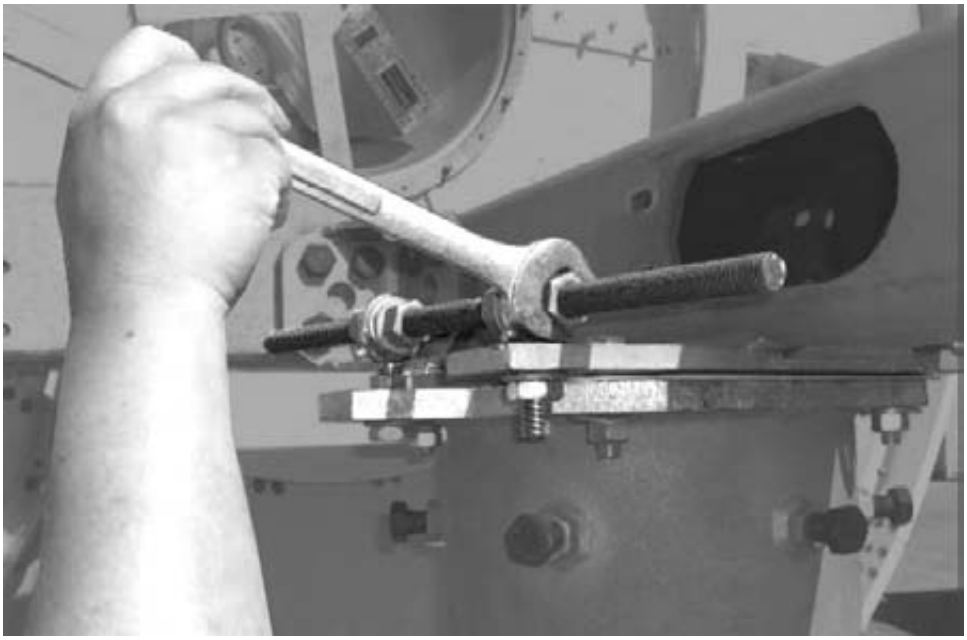


Figure 70

Step 8

Tighten 4 x 5/8 azimuth bolts per ASTM A325 procedures.

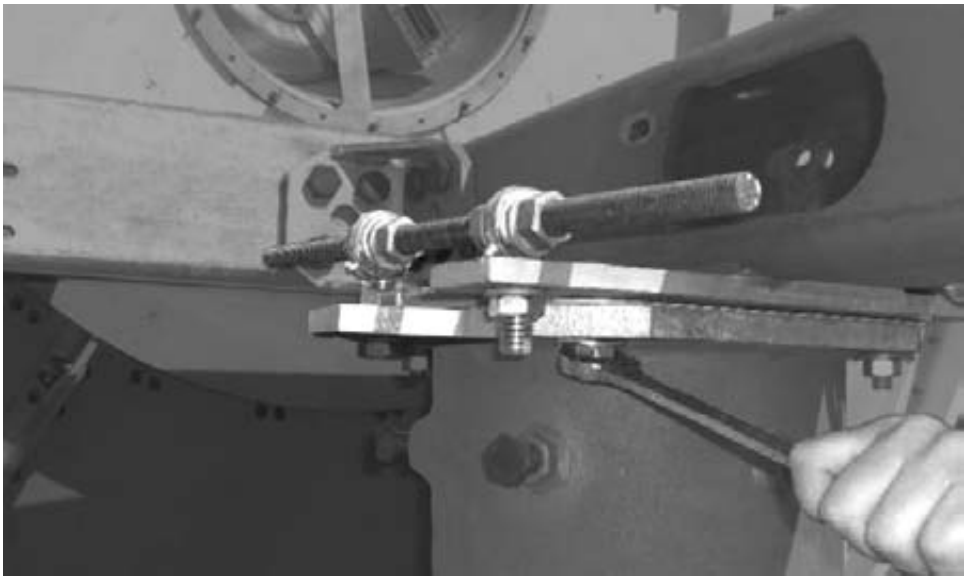


Figure 71

Installation Procedures

Feed Strut Assembly

Step 1

First lay subreflector struts on the ground. Use 3/8-16 bolts, lock washers, nuts and four L-brackets to combine struts. Attach U-brackets to struts with bolts, lock washers and nuts.

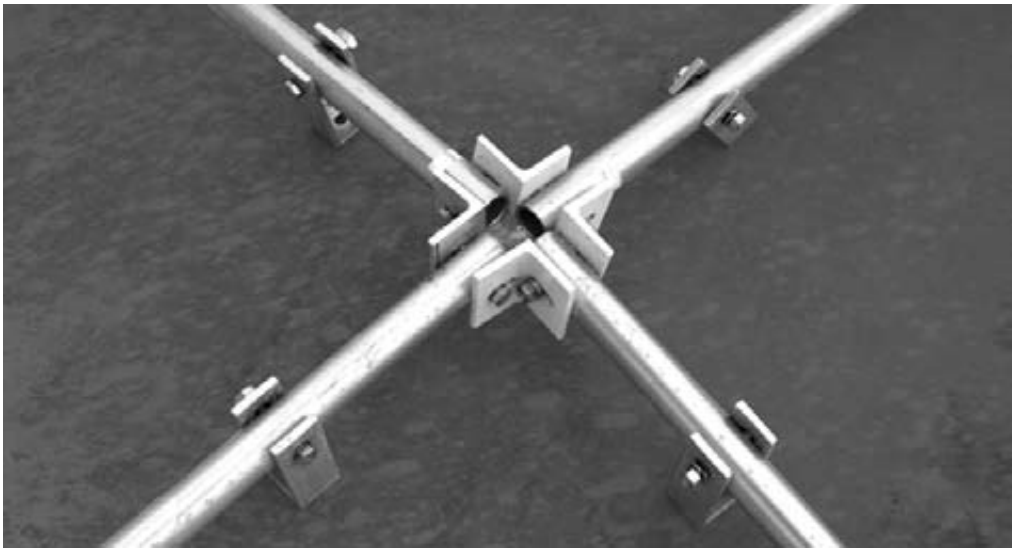


Figure 72

Step 2

Attached adjustment plate (303763) to the U-brackets. Hand tighten all bolts/nuts.

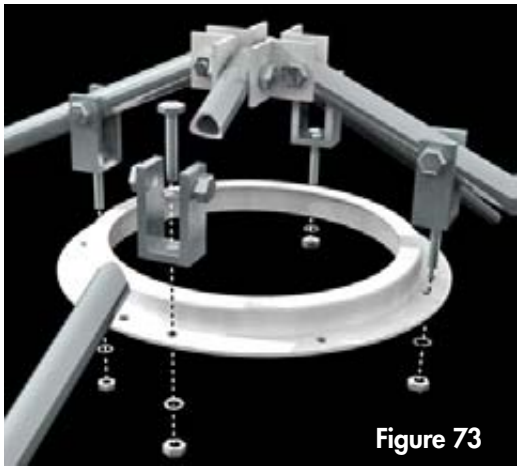


Figure 73

Step 3

Attached remaining L-brackets to the ends of the struts with 3/8 long hardware and hand tighten.

Figure 74

Installation Procedures

Subreflector Assembly

Step 1

Screw 3 all-threaded rods to the subreflector as shown on Figure 4 below.

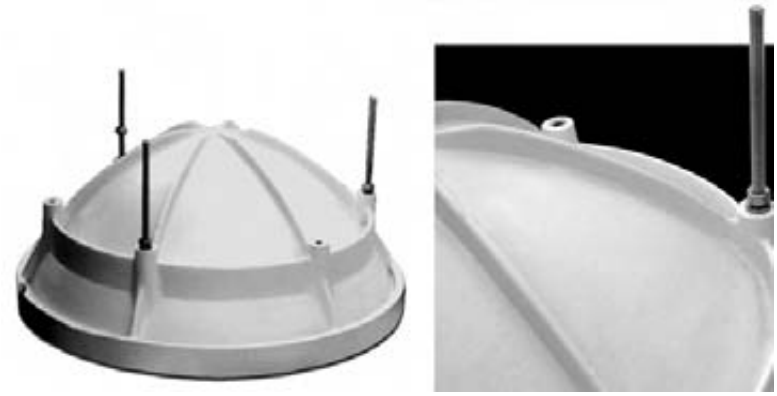


Figure 75

Step 2

Place assembly inside the reflector (on the ground or on the mount) 90° elevation position.

Figure 76

Step 3

Place backup plates behind the reflector and align as shown with holes in reflector. Assemble angle brackets to reflector with 3/8-16 bolts, lock washers, nuts and backup plates.

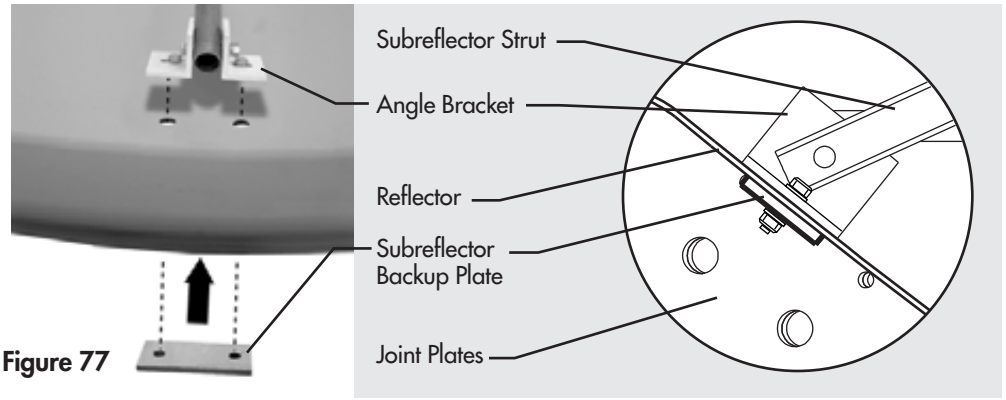
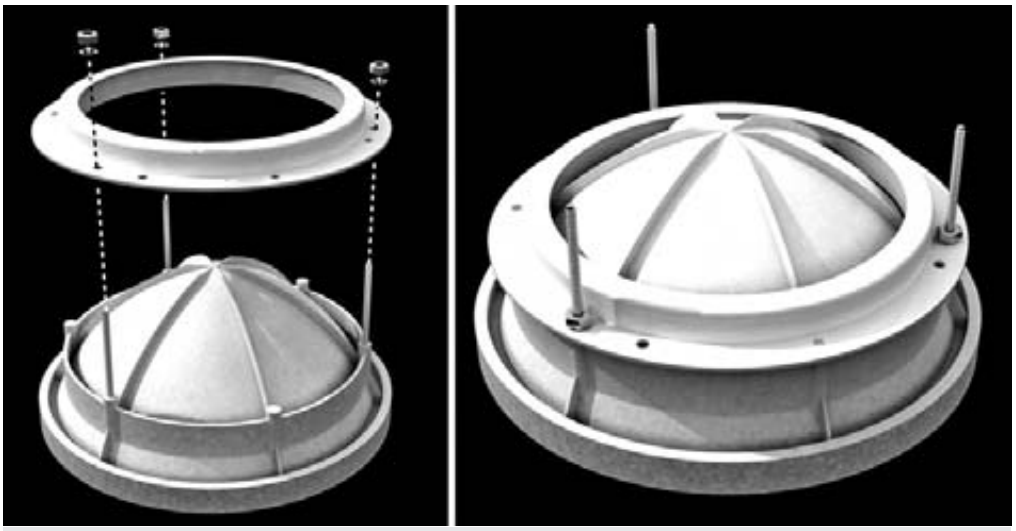


Figure 77

Installation Procedures

Step 4

Attach Subreflector to Adjustment Plate as shown.Positioned subreflector as shown on Figure 78 below (48.16" from the top of the reflector skin to the bottom of the subreflector flat surface). this dimension represents most probable reflector apex distance (focal point).



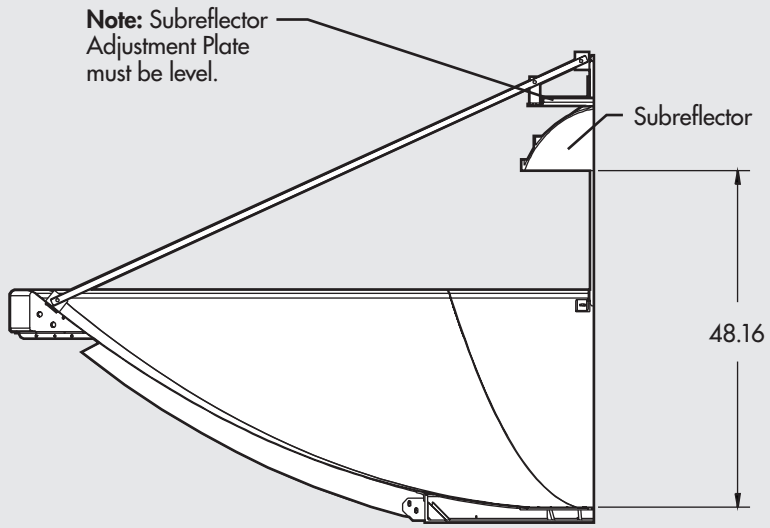


Figure 78

Figure 79

Preventive Maintenance

Overview

This section contains periodic preventative maintenance instructions for the 4.0-Meter Earth Station Antenna. Included in this section are inspection and preventative maintenance procedures including cleaning and lubrication, painting and an operational voltage/current checkout procedure deemed within the capabilities of the average station technician. Refer to applicable vendor manuals for any repair procedures not included in this section yet designated as capable of being performed in the "field" rather than requiring specialized facilities, tools and/or test equipment as well as technically trained personnel.

An operational checkout procedure provides an accurate indication of the overall earth station performance and should be performed at intervals of approximately three months. This procedure is essentially performed during the various modes of normal operation of the earth station. In addition, the operational checkout procedure should be performed after any repairs or adjustments have been made, or whenever the earth station is suspected of degraded operation. If any discrepancy in performance exists and the condition cannot be readily remedied to return the earth station to a proper operating condition, the appropriate troubleshooting procedures should be referenced to locate the fault. After the trouble is determined and the repairs effected, a final operational checkout procedure should be performed to verify that all discrepancies have been corrected.

The following paragraphs describe the inspection and preventative maintenance procedures for the earth station. These instructions include general cleaning and inspection, the preservation of metal parts and the lubrication of moving parts. Periodic replacement of assemblies or components as a preventative measure is not required. Malfunctions of the earth station can be traced to components, assemblies and parts through the use of applicable troubleshooting procedures.

General Cleaning

To prevent the excessive accumulation of dust and dirt as well as the removal of such contaminants, thoroughly clean the equipment whenever visually inspecting the earth station components. No special cleaning procedures are required. However, a thorough cleaning in accordance with the following procedures is required to assure continued trouble-free operation.

Electrical Parts

Minor cleaning, such as the removal of dust and loose foreign particles can be accomplished by one of the following:

- Vacuuming
- Using a soft brush or lint-free cloth
- Blowing out the dust and dirt with low pressure (5 to 25 psi), dry compressed air

When using air to blow off the contaminants, either avoid or be careful when directing the air stream on delicate parts. To remove imbedded dirt, grease or oil from electrical parts: use a 50% solution of isopropyl (rubbing) alcohol and apply with a soft bristle brush. It may be necessary to brush some parts vigorously with a stiff bristle brush to remove imbedded and hardened dirt particles. If possible, avoid excessive use of cleaning solvent on electrical insulation. After cleaning, allow the cleaned parts to dry for 10 to 15 minutes before placing the equipment into operation.

Preventive Maintenance

Mechanical Parts

Clean mechanical parts by first removing dust, dirt and other loose contaminants with a scraper, stiff brush (bristle, or wire in the case of rust or corrosion), or cloth or compressed air at 25 to 40 psi. Any accumulated imbedded dirt, corrosion, grease or oil deposits that require further cleaning may be removed with a bristle or wire brush and a cleaning solvent such as trichlorethylene or equal. After cleaning, allow cleaned parts to dry for 10 to 15 minutes before placing the equipment into operation.

Inspection

The frequency of inspection is contingent upon the user's individual standards and the operational environment in which the earth station is located. However, a visual inspection of the earth station components should be performed st least semi-annually. Where there are no established wear limits, perform a visual inspection to locate worn or damaged parts which could cause improper functioning of the earth station. It is recommended that the mechanical and electrical inspection be performed on the assembled or partially disassembled equipment to determine the extent of disassembly required prior to completely disassembling a suspected malfunctioning component or module. In the absence of any special inspection requirements, operational tests are the most effective means in isolating parts and assemblies requiring further inspection. Any condition noted during inspection that may preclude continued proper operation of the earth station prior to the next scheduled inspection should be noted. The discrepant condition should be corrected (repaired or replaced) immediately or at the conclusion of the inspection procedure.

Local Control/Motor Drive Controller

Inspection of the local control/motor drive controller conforms generally to standard visual inspection procedures on electromechanical equipment. In addition to these standard procedures, perform the following checks and visual inspections for the specific conditions noted:

WARNING

Care must be taken to avoid electrical shock. Failure to heed warning could result in injury or death.

- Check the main panel for illegible and indistinct panel markings.
- Connect the detachable hand controller assembly (local control) for visible signs of damage such as cracked housing, damaged connector/bent pins, cuts or damage to cable jacket insulation, etc. Examine selector switches for damage and proper actuation
  movement.
- Inspect all wiring and cables for discoloration and burned insulation, dirt, breaks, security of connection and other signs of deterioration. Examine connections for dirt, flux, corrosion and mechanical defects. Check for loose or broken lacing and cut, brittle, abraded, frayed or cracked insulation.
- Examine connectors for corrosion, broken inserts and stripped threads. Check connector shells for distortion and dents, and contact pins for bends, misalignment or other deformities. Check connector inserts for carbon tracking indicating arc-over.

Preventive Maintenance

- Check all electrical components for dirt, chips, cracks, breaks, discoloration or other signs of deterioration and damage. A discolored, blistered or burnt condition is evidence of overload. Measure actual value of suspect electrical components and compare against specified value where applicable.

- Check transformer for an excessive wax deposit on the surface, discoloration or a pungent odor indicative of burning varnish denoting overheating or a total breakdown.

- Check all terminal blocks for broken or missing terminals and stripped threads. Check tightness of lead attaching hardware.

Caution

Make sure electrical power has been disconnected.

- Check the motor starters and circuit breakers for free operation. Check tightness of all wire connections.

- Visually inspect printed circuit board for signs of debris that might short out components. Verify that all LED indicators are functioning correctly. Check the terminal block connectors for tightness of lead attracting hardware and signs of scorching or burning.

- Check for security of all hardware and stripped or otherwise damaged threads. Check metallic parts for corrosion, dents, distortion and other deformation.

- Check for evidence of water inside the enclosure. If any water is in evidence, check that all seals are intact and if not, use a coating of RTV-108 (silicone rubber sealant) to seal any exposed electrical fitting, bolt hole or other possible water entry into the enclosed electrical components in order to maintain a water proof condition.

- Check or change vapor corrosion inhibitor unit.

Antenna

Inspection of the antenna conforms generally to standard visual inspection procedures performed on electromechanical equipment. In addition to these procedures, perform the following checks and visual inspections for the specific conditions noted:

- Inspect all wiring and cables, particularly the network to enclosure and enclosure to mount interfaces, for discoloration and burned insulation, moisture entry, corrosion, dirt, breaks, security of connection, and other signs of deterioration. Examine connections for dirt, corrosion and mechanical defects. Check for loose or broken lacing and cut, abraded, frayed, brittle and cracked insulation.

- Examine connectors for corrosion, broken inserts and stripped threads. Check connector shells for distortion and dents, and contact pins for bends, misalignment or other deformities. Check connector inserts for cracks, carbon tracking, burns or charring indicating arc-over.

Preventive Maintenance

- Check all electrical components for dirt, cracks, chips, breaks, discoloration and other signs of deterioration and damage. A discolored, blistered or burnt condition is evidence of overload.

- Operate the azimuth and elevation drives as well as the feed rotation in both the plus and minus direction from the local control/motor drive controller at least once every three months during antenna down time. Check the mechanical limit switches provided at the end points stop antenna and feed movement, and limit travel to prevent structural interference and damage. Check the mechanical limit switches for corrosion and water entry and the arm on each feed limit switch for free movement without binding. Be certain both feed rotation limit switch arms are not distorted and ride centrally on the actuating cam to open their corresponding limits switch.

- Inspect the azimuth and elevation jackscrew boots for security of attachment at both ends, for abrasion, tears, cuts, brittleness and other damage that may expose the jackscrew to the environment (water, dust, etc.). Minor repairs can be made with RTV-108 silicone rubber sealant.

- Visually inspect the feed window for dirt and the feed, feed supports, feed window and reflector for distortion, foreign object damage and environmental deterioration due to ice and snow, dust, rain, hail and high winds, etc. which may cause electrical component and/or structural deformation.

- Check the cable attachment to the resolvers and to the LNA or LNBs and enclo sure mount interface for security, the cable rouging for secure hanger attachment and the cable insulation for cuts, cracking, abrasion and other deterioration. Check the LNA or LNBs and the resolvers for a secure mechanical attachment. Ensure proper torquing of polarization drive gear box setscrews and appropriate tensioning of corresponding drive chain assembly, if applicable.

- Check (if applicable) that the drain holes in the bottom of the enclosure are not obstructed and there is no evidence of water accumulation. Check the enclosure doors for proper closure and that the door seals are intact, not torn, abraded or otherwise damaged. Check that all other seals are intact and if not, use a coating of RTV-108 (silicone rubber sealant) to seal any exposed electrical fitting, bolt hole, or other possible water entry to electrical components in order to maintain a weatherproof condition. If the enclosure is provided with a vent fan, check for free operation of the fan blade. The fan bearings are permanently lubricated; any binding, abnormal noise or vibration necessitates replacement of the fan assembly. Check and replace the fan filter element if it appears dirty or obstructed with dust.

- Check for the appearance of surface lubricants that will cause the accumulation of dirt and grime. Clean off all excess surface lubricants with a cloth and, if required, a cloth dampened (not wetted) with trichlorethylene, or equal.

- Visually inspect all mechanical parts for freedom of operation with no misalignment, binding or interference. Check all cabling for sufficient slack to prevent cable strain as well as adequate restraint to prevent abrasion or chaffing during antenna and feed movement.

Preventive Maintenance

- Check security of antenna mounting and interconnecting assembly hardware. Be certain all electrical grounding connections (including cross-axis grounding straps) and intact and secure, not corroded or broken. Thoroughly clean any noticeable corroded portions of grounding cables, unplated portion of universal terminals and corresponding mounting surfaces with a wire brush. Replace rather than tighten any loose A-325 structural hardware. The hardware distorts at initial installation and once loosened will not maintain the required high strength friction connection. All other assembly and installation hardware should be tightened to its original torqued condition. When installing new structural hardware, do not use a wrench with a lever arm longer than two feet.

- Examine painted aluminum and galvanized surfaces and touch-up where required.

Drive System Voltage and Current Checks

At the conclusion of the installation procedure and prior to turning the system over to the station facility, an installation acceptance check-off sheet was prepared and duly signed off if installed by an Andrew crew. Part of this check-off included voltage readings retaken to determine if proper voltage was available. Current readings were also taken as a reference for future comparison to serve as a troubleshooting aid in determining possible equipment degradation and shortened life. Any current reading taken during the following procedure that significantly varies by more than five percent from the preestablished reference values necessitates trouble shooting the particular system involved to determine the cause and required corrective action.

Step 1

Approximately every three months and during a period of down time, disconnect as applicable the RF transmitter and all power supplies. The main disconnect switch in the main load center box at the antenna site must be in the ON position and the detachable hand-held controller assembly must be plugged in.

Step 2

Open the outer local control/motor drive controller door at the antenna site to gain access to the conductors supplying power to the azimuth, elevation and polarization drive motors. Turn the primary power disconnect switch to the ON position.

Step 3

Turn the Az/El speed switch to the FAST position. Turn the AZIMUTH EAST/WEST switch to either position and while the antenna is rotating, carefully use a clamp-on ammeter in accordance with the ammeter manufacturer's instructions to take current readings off each of the power conductors (phases) connected to the main terminal block at the bottom of the panel. Record the current draw in the equipment log and compare the readings to the reference values entered in the installation/acceptance checkoff. If the readings differ significantly, refer to the appropriate troubleshooting information and perform the applicable corrective action. Then take voltage readings off each of the three conductors; the readings should agree with each other - within two percent. Turn the AZIMUTH switch to OFF.

Step 4

Repeat preceding step (3) with the AZIMUTH EAST/WEST switch in the alternate operating position.

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Step 5

Turn the ELEVATION DOWN/UP switch to either position and while the antenna is rotating, carefully use a clamp-on ammeter in accordance with the ammeter manufacturer's instructions to take current readings off each of the power conductors (phases) connected to the main terminal block at the bottom of the panel. Record the current draw in the equipment log and compare the readings to the reference values entered in the installation/ acceptance check-off. If the readings differ significantly, refer to the appropriate troubleshooting information and perform the applicable corrective action. Then take voltage readings off each of the three conductors; the readings should agree with each other - within two percent. Turn the ELEVATION switch to OFF.

Step 6

Repeat the preceding step (5) with the ELEVATION DOWN/UP switch in the alternate operating position.

Step 7

Repeat steps 3 through 6 with the Az/El speed in the SLOW position.

Step 8

If all voltage and current readings are within tolerance, turn the primary power disconnect switch OFF. Then close and lock the outer local motor controller door. Disconnect the hand held controller to return antenna control to studio.

Pedestal Mount Bearing Pad Adjustment

The bearing pad (within the pedestal mount) adjustment rods/bolts require yearly adjustment and verification of torque value. With the antenna at zenith (90 degrees), follow the procedures presented below:

Step 1

Loosen jam nuts on all rods/bolts.

Step 2

Torque the upper adjustment rod evenly to 40-45 foot-pounds. Then torque the lower adjustment rod evenly to 40-45 foot-pounds.

Step 3

Torque the upper adjustment bolt evenly to 40-45 foot-pounds. Then torque the lower adjustment bolt evenly to 40-45 foot-pounds.

Step 4

Repeat steps 2 and 3 verifying all adjustment rods/bolts are evenly torqued within the limits specified.

Step 5

Tighten the jam nuts.

Preventive Maintenance

Preservation of Component Parts

When preserving component parts, refer to the following paragraphs in this section.

Aluminum Parts

Remove all loose paint and corrosion by scraping, wire brushing or using steel wool. If using steel wool near the feed window, make sure that none remains on the feed horn window. Edges of existing paint can be blended with a metal surface by using a fine grit sandpaper. Wipe the surface to be painted with a soft rag dampened in trichlorethylene, lacquer thinner or equal. Be certain to remove all loose paint, corrosion, imbedded dirt, grease and oil deposits or the paint will not adhere to the surface. Lacquer thinner will dissolve paint if applied heavily and rubbed vigorously. The reflector may be washed with plain water if necessary. Do not use bleach, soap solutions or kerosene as it is difficult to remove the residue. Allow the cleaned surfaces to dry thoroughly before priming.

Prime the cleaned surface by applying zinc chromate primer. The primer can be applied with brush, roller or pressurized spray. If necessary, thin the primer with lacquer thinner to the proper consistency. Feather primer onto adjacent painted surfaces. Allow primer to thoroughly dry before applying the finish paint coat.

Paint all RF surfaces, such as the inside of the main reflector and subreflector with a high-reflectance white paint. This type of paint disperses light rays, reducing the focusing effect of the sun's radiation, thereby reducing heat build-up caused by the focused sun's rays on the feed system. Rear surfaces of the reflector and subreflector may be painted with a flat white enamel paint. The paint can be applied with a brush, roller or pressurized spray. If necessary, thin the paint with the appropriate thinner to the proper consistency. Thoroughly pain over the primed surfaces and blend with the existing painted surfaces.

Galvanized Surfaces

Remove all loose paint and corrosion by scraping, wire brushing or using steel wool. Edges of existing paint can be blended with the metal surface by using a fine grit sandpaper. Wipe the surface to be painted with a soft rag dampened in trichlorethylene, lacquer thinner, or equal. Be certain to remove all loose paint, corrosion, imbedded dirt, grease, and oil deposits or the paint will not adhere to the surface. Lacquer thinner will dissolve paint if applied heavily and rubbed vigorously. Do not use bleach, soap solutions or kerosene as it is difficult to remove these products' residue. Allow the clean surface to dry thoroughly before painting.

Paint the cleaned surface with a zinc-rich paint. The paint can be applied with a brush, roller or pressurized spray. If necessary, thin the paint with the appropriate thinner to the proper consistency.

Thoroughly paint over the cleaned surface and blend with the existing painted surface.

Lubrication

For long life and trouble-free operation be certain no to extend the lubrication schedule beyond the frequency recommended in Table 1. The frequency should be shortened if the antenna is subjected to an adverse environment (e.g. high temperature, extended periods of rainfall, high humidity, dust storms, etc.). Any component or part should be immediately be lubricated if, during inspection or operation, rough, jarring or intermittent motion is noted, or if squeaky or other unusual noises are heard. Lubrication is required on all metal-to-metal rolling or sliding parts. Use the lubricants recommended. Do not over lubricate. Over-lubrication can often be as damaging as under-lubrication. Prior to the application of lubricant to any parts, use a clean cloth and/or bristle brush and remove any old lubricant to prevent an excessive build-up.

Preventive Maintenance

Remove indicated access plugs from square tube weldment and apply lubricant to panning frame tube assembly and corresponding thrust pads. Securely replace access plugs in square tube weldment. Be certain to remove any protective caps and clean off each lubrication fitting prior to injecting fresh grease. The elevation and azimuth jackscrew assemblies are equipped with a grease fitting and corresponding pipe plug on opposite sides of the jack housing. Remove the appropriate pipe plug and fill it with grease until lubricant seeps from pipe plug opening. Replace and securely tighten pipe plug.

The following is a list of the lubricant characteristics:

- **Mobil Temp SHC32** A non-soap hydrocarbon fluid type grease. Operating temperature is -65 degrees to 350+ degrees Fahrenheit (-54 degrees to 177+ degrees Celsius).
- **Mobil SHC624** A low temperature synthetic oil for worm gear reducers. Operating temperature range is -40 degrees to 125+ degrees Fahrenheit (-40 degrees to 52+ degrees Celsius).
- **Moly Grease** A grease lubricant containing molybdenum disulfide. Operating Lubricant temperature range is -85 degrees to 300+ degrees Fahrenheit (-29 degrees to 149+ degrees Celsius).

Jackscrews/Motors

Periodically inspect lifting screws on jackscrew assemblies to insure adequate lubrication. Loosen jackscrew boot clamps to expose the lifting screw assembly. Fully extend jackscrew assembly, being careful not to exceed preset mechanical limits. Brush thin coating of Mobil SHC32 grease on exposed lifting screw. Replace boot and attach corresponding boot clamps. If lifting screw is rusty, remove existing lubricant with solvent and wire brush rusted area. Rinse with solvent and apply fresh grease.

Periodically inspect and remove dust and dirt deposits from the motor housings to avoid hindering the thread exchange with the ambient air. Slight dirt accumulation on the air vent screw through splash oil cannot be avoided, however, keep vent screw clean to ensure proper pressure compensation.

Gear Motor/Housing Fill Drain Requirements

Lube points 2 and 4, shown in Table 1, require removal of the indicated drain plugs and collecting/measuring the amount of SHC624 drain oil using measuring cup. The specified amount of oil must be added to the gear motor/hosing (after installing the drain plug) via the fill/vent plug opening using supplied funnel. Addition of the oil requires use of an appropriate filling utensil. Use of a modified level stick will not correctly gauge the appropriate amount of oil in the gear housings.

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Table 1. Antenna Lubrication Chart

Lube Point	Parts to be Lubricated	Action	Frequency	Service Type	Lube Type	Quantity/ Points	Andrew Number
1	Elevation Jackscrew Housing	Lubricate	Every 3 months	Pressure Fitting	SHC32	1	49208
2	Elevation Gear Motor Housing Fill and Drain	Inspect Change	Monthly 3 months	Pipe Plugs	SHC624	10 oz	47497
3	Azimuth Jackscrew Housing	Lubricate	3 months	Pressure Fitting	SHC32	2	49208
4	Azimuth Gear Motor Housing Fill and Drain	Inspect Change	Monthly 3 months	Pipe Plugs	SHC624	10 oz	47497
5	Panning Frame Tube Assembly and Thrust Pads	Lubricate	3 months	Aerosol Spray Lubricant	Dry Moly	Surface Coverage	207911

Inspection requires checking for visible signs of oil leakage, draining, replacing and adding oil to ensure appropriate oil level requirements. Excessively dirty oil will require fresh replacement. If oil leakage is found to be excessive, refer to appropriate troubleshooting information and perform applicable corrective action. Periodic inspection procedures can be less frequent after first or second scheduled inspections.

Initial oil change requirements include flushing gear boxes with a standard cleaning agent.